

# Hunters Point Naval Shipyard, Parcel G, RSY Data Report

Contract No. N62473-17-D-006 CTO N6247318F5065 RSY Pad Data Report	
RSY Pad: RSY 1 Use1	Soil Origin: TU-077A ESU
Data attached and submitted by: Amy Mangel	Data Report Submittal Date: 01/21/2021

Systematic Soil Sample Data: RSY 1 Use 1							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 Nal Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	<sup>90</sup> Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331
HPPG-ESU-TU077A-001	1	Systematic	12,484	15,359	0.358	-0.0129	-0.129
HPPG-ESU-TU077A-002	2	Systematic	11,854	15,359	0.539	0.0365	N/A
HPPG-ESU-TU077A-003	3	Systematic	11,173	15,359	0.397	0.0200	N/A
HPPG-ESU-TU077A-004	4	Systematic	11,638	15,359	0.637	-0.0252	N/A
HPPG-ESU-TU077A-005	5	Systematic	12,104	15,359	0.510	-0.0242	N/A
HPPG-ESU-TU077A-006	6	Systematic	9,786	15,359	0.373	-0.00184	N/A
HPPG-ESU-TU077A-007	7	Systematic	10,630	15,359	0.338	0.000	N/A
HPPG-ESU-TU077A-008	8	Systematic	10,627	15,359	0.505	-0.00532	N/A
HPPG-ESU-TU077A-009	9	Systematic	11,882	15,359	0.329	-0.0116	N/A
HPPG-ESU-TU077A-010	10	Systematic	11,971	15,359	0.381	0.0164	N/A
HPPG-ESU-TU077A-011	11	Systematic	11,753	15,359	0.456	-0.0198	0.154
HPPG-ESU-TU077A-012	12	Systematic	11,473	15,359	0.481	-0.0442	N/A
HPPG-ESU-TU077A-013	13	Systematic	11,648	15,359	0.423	0.00301	N/A
HPPG-ESU-TU077A-014	14	Systematic	11,472	15,359	0.458	0.0297	N/A
HPPG-ESU-TU077A-015	15	Systematic	12,454	15,359	0.309	-0.0139	N/A
HPPG-ESU-TU077A-016	16	Systematic	11,213	15,359	0.280	0.0125	N/A
HPPG-ESU-TU077A-017	17	Systematic	10,923	15,359	0.517	-0.0159	N/A
HPPG-ESU-TU077A-018	18	Systematic	12,332	15,359	0.600	0.000	N/A
HPPG-ESU-TU077A-019	19	Systematic	12,099	15,359	0.374	0.0269	N/A
HPPG-ESU-TU077A-020	20	Systematic	12,256	15,359	0.526	0.0290	N/A
HPPG-ESU-TU077A-021	21	Systematic	11,773	15,359	0.169	-0.0169	-0.0369
HPPG-ESU-TU077A-022	22	Systematic	9,882	15,359	0.329	-0.0478	N/A
HPPG-ESU-TU077A-023	23	Systematic	10,717	15,359	0.278	-0.0488	N/A
HPPG-ESU-TU077A-024	24	Systematic	11,355	15,359	0.460	-0.0352	N/A
HPPG-ESU-TU077A-025	25	Systematic	11,338	15,359	0.510	-0.0461	N/A
<b>Soil Systematic Sample Statistics</b>					<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	<sup>90</sup> Sr Final Analytical Results (pCi/g)
Maximum					0.637	0.0365	0.154
Mean					0.4215	-0.0078	-0.004
Median					0.423	-0.0116	-0.0369
Minimum					0.169	-0.0488	-0.129
Standard Deviation					0.1107	0.0256	N/A

Biased Soil Sample Data: RSY 1 Use 1							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 Nal Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	Total <sup>90</sup> Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331
HPPG-ESU-TU077A-B-001	1	Biased	12,477	15,359	0.547	0.00825	-0.0903

CPM Counts per minute  
pCi/g Picocuries per gram

\* Note: Project Remediation goal (RG) is the Record of Decision RG or Offsite RBA value, whichever is higher

Instrument and Survey Summary					
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #
Gamma Walkover Survey	HPRS-11102020-PG-ROV-292	11/10/2020	RS-700	03/31/2022	5447/5448
Follow-Up Static Survey	HPRS-11112020-PG-JSS-293	11/11/2020	RS-700	03/31/2022	5447/5448
Systematic Sample Survey	HPRS-11112020-PG-JSS-294	11/11/2020	3x3	10/09/2021	271420
Biased Sample Survey	HPRS-11112020-PG-JSS-295	11/11/2020	3x3	10/09/2021	271420

Region of Interest (ROI) Summary	
ROI	Nuclide and Energy
ROI 3	Ra-226 (1764 keV)
ROI 6	Ra-226 (609 keV)
ROI 7	Cs-137 (662 keV)
ROI 8	Ra-226 (351 keV)
ROI 10	Gross Gamma

Summary: RSY 1 Use 1
<p>1) Gamma walkover survey and data review—upon review of initial RS-700 scan data in accordance with Final Parcel G Work Plan Section 3.5.1.1, 43 follow-up static investigations were required. Gamma scan data summary statistics, normal Q-Q plots, histograms, and box plots are provided on pages 3-6. Contour maps of the scan data for the ROIs of interest are presented on page 7. The RSY scan data was lower than the background scan data. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.</p>
<p>2) One-minute static follow-up measurements with the RS-700 were collected at 43 gamma walkover investigation locations in accordance with Final Parcel G Work Plan Section 3.3.1. A map of the follow-up locations is presented on page 9. The net follow-up static spectra are presented on pages 14-56. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.</p>
<p>3) In accordance with Final Parcel G Work Plan Section 3.4.1, twenty-five systematic soil samples (001-025) were obtained and submitted for gamma spectroscopy analysis. Sample locations are shown on the Systematic Sample Survey map (page 10). TestAmerica sample results are attached (pages 57-95). Ten percent of the systematic soil samples (three samples in total -001, -011, &amp; -021) were also analyzed for <sup>90</sup>Strontium. Strontium-90 results are also included in the TestAmerica sample results report (pages 57-95). Samples HPPG-F-033 and HPPG-F-034 are field duplicates, correlating to systematic samples -001 and -017. The Data Quality Assessment which will be included in the RACR will provide an analysis and discussion of field duplicates for the project. The Instrument and Survey Summary table above lists the 3x3 NaI detector used for the gamma static measurements collected during sampling activities, and the instrument-specific gamma static IL listed in the sample tables on page one is developed from that instrument's RBA data.</p> <p>Systematic sample histograms, box plots, Q-Q plots, and power curves are provided on pages 12-13. All sample results were below the applicable RGs. The number of samples collected was sufficient to meet project DQOs.</p>
<p>4) In accordance with Final Parcel G Work Plan Section 3.3.1, one biased sample was collected from the location of the highest gross gamma scan measurement, since all follow-up static measurements were below the ROC-specific critical levels. TestAmerica sample results are attached (pages 96-110). A map of the biased sample location is presented on page 11. Biased sample results were all below the applicable RGs.</p>
<p><b>Conclusions:</b></p> <p>In accordance with the DQOs in Section 3.1 of the Final Parcel G Work Plan, final analytical results for all samples from the RSY pad were shown by a point by point comparison to meet the RGs. Graphical comparisons demonstrated that ROC concentrations were consistent with background.</p> <p>RSY 1 Use 1 contains soil from Hunters Point Naval Shipyard Parcel G Phase 1 excavation TU-077A ESU.</p> <p>APTIM requests RASO concurrence to release this soil as Non-LLRW.</p> <p>Disposition: This soil shall be used as backfill for TU-077.</p>

## Soil Scan Statistics

### Statistical Summary

Dataset	PG-RSY-01-U1				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	4.01	36.08	16.96	17.04	4.26
ROI-06	63.15	157.33	109.95	110.24	12.87
ROI-07	46.10	118.26	84.03	84.19	10.63
ROI-08	76.16	186.47	137.45	137.32	14.46
ROI-10	2,087.41	3,173.51	2,789.23	2,812.95	159.38

### Statistical Summary Reference Background

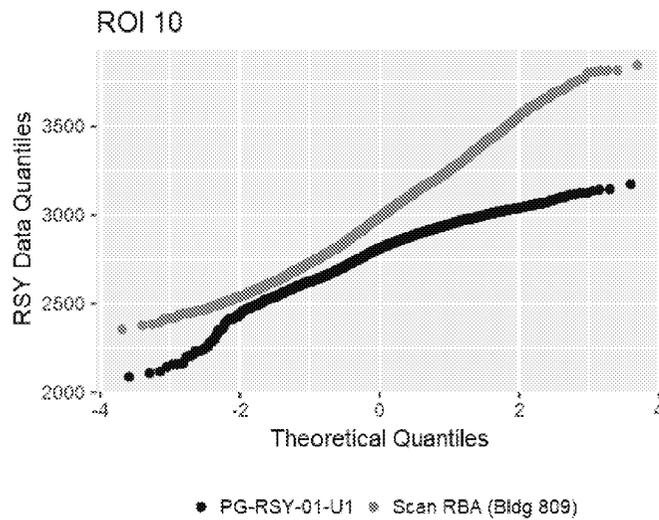
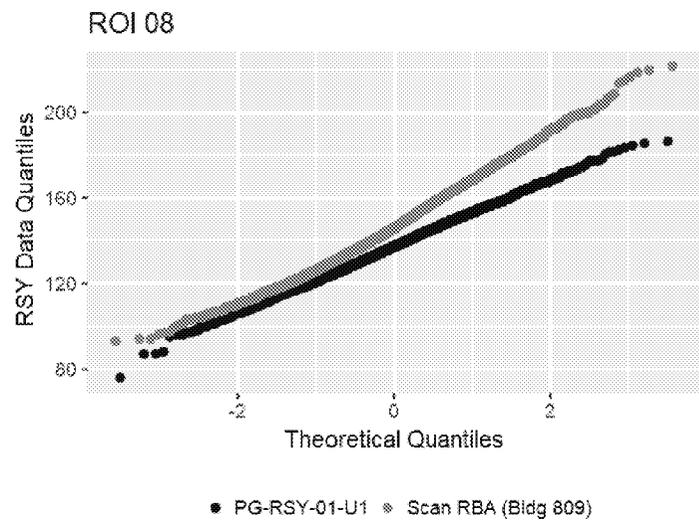
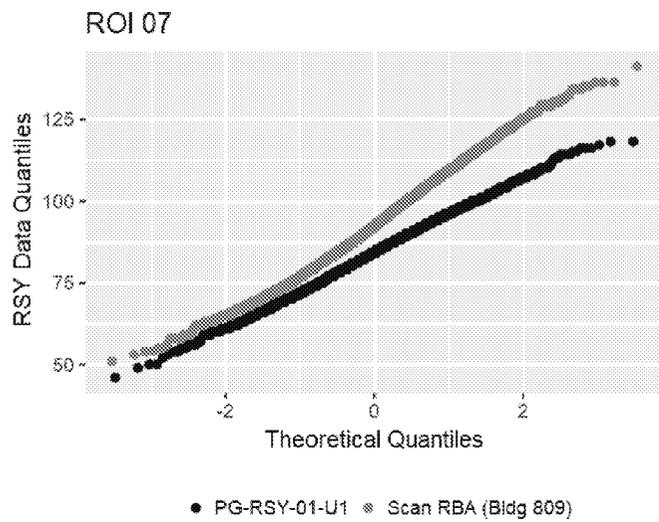
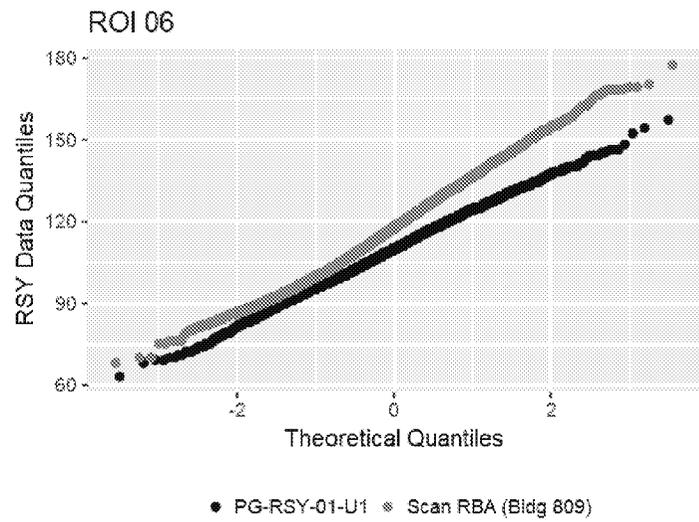
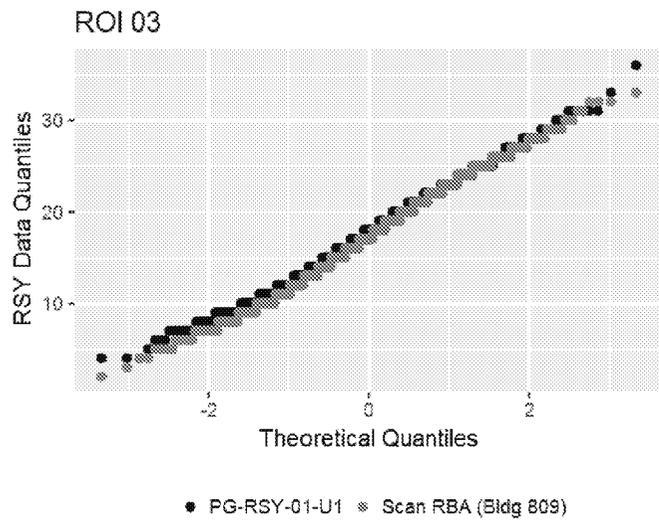
TYPE	Scan RBA (Bldg 809)				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	2.00	33.08	16.21	16.04	4.13
ROI-06	68.15	177.45	117.58	117.26	15.50
ROI-07	51.11	141.33	92.34	91.24	13.43
ROI-08	93.19	221.48	146.24	145.30	18.21
ROI-10	2,354.11	3,845.31	2,995.57	2,989.64	255.66

cps = counts per second

Dataset	Number of Data Points
PG-RSY-01-U1	3106
Scan RBA (Bldg 809)	4632

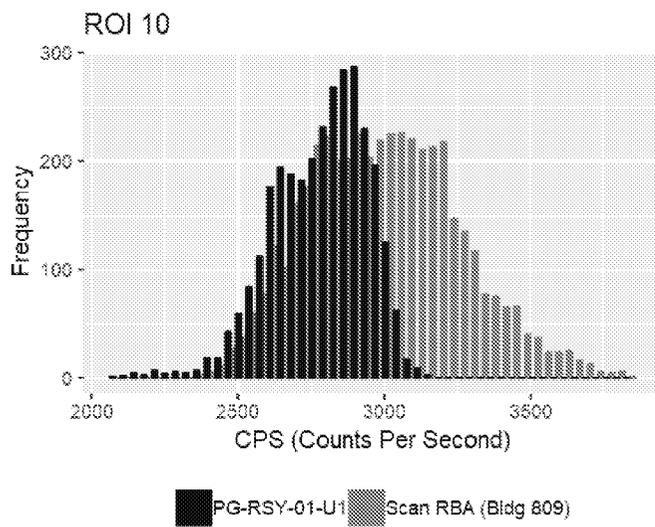
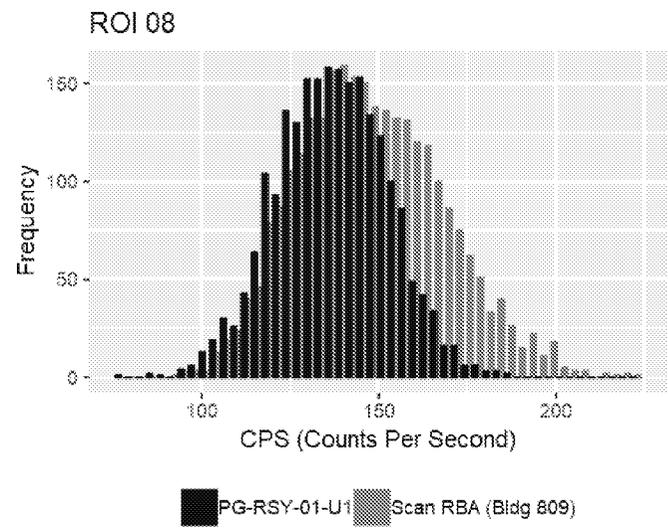
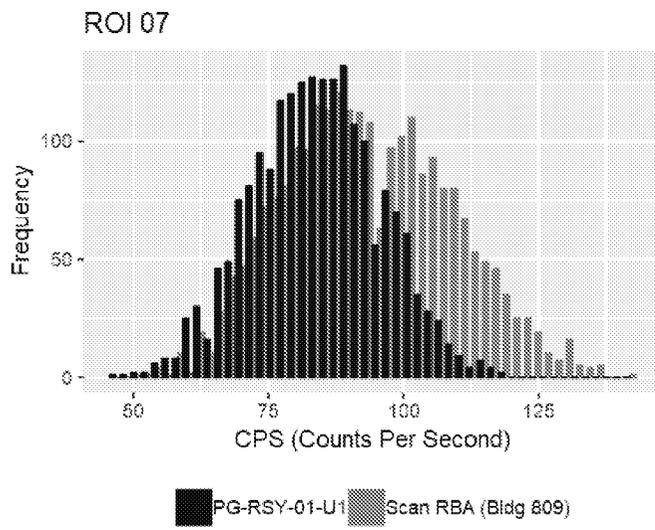
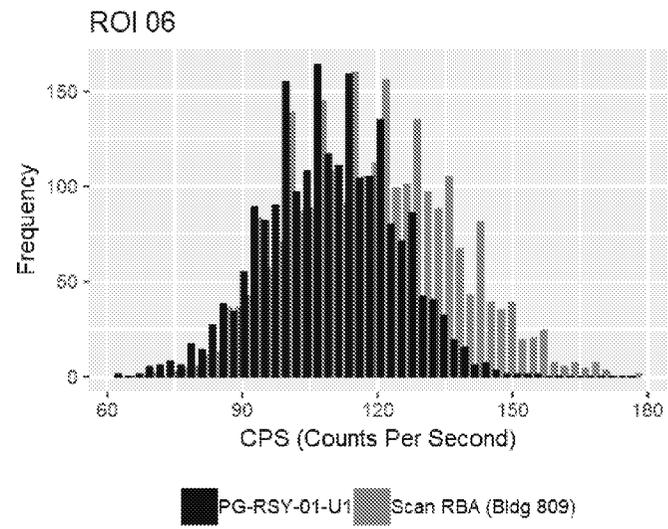
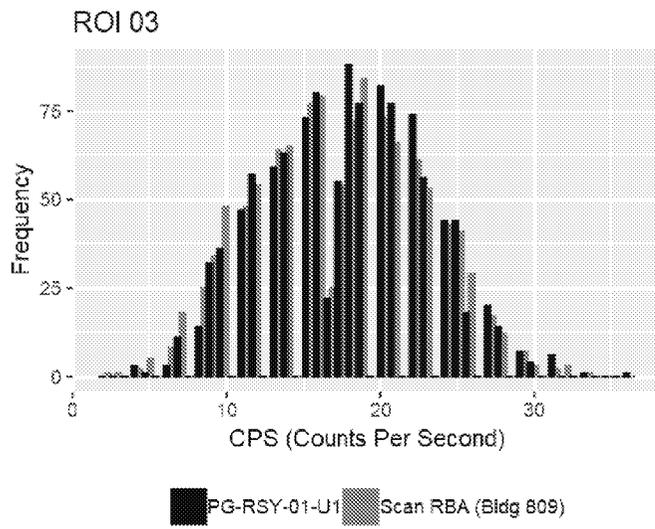
# Soil Scan Statistics

## Normal Q-Q Plots



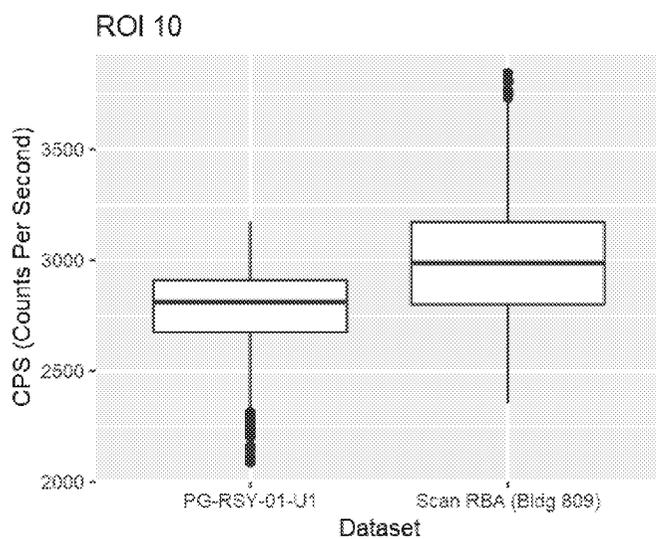
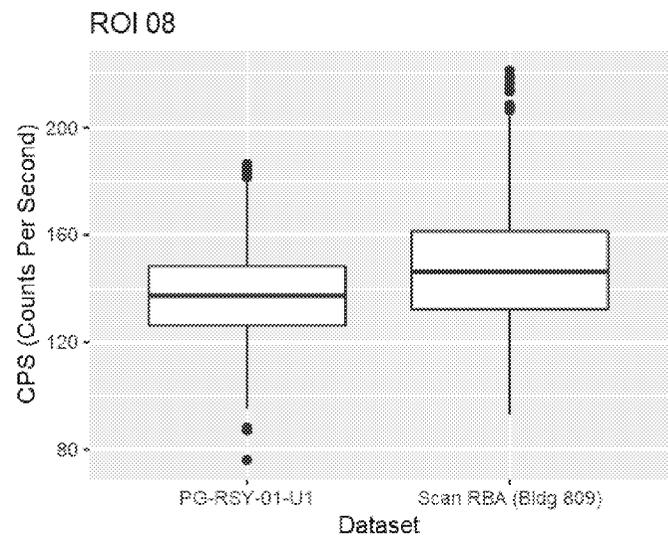
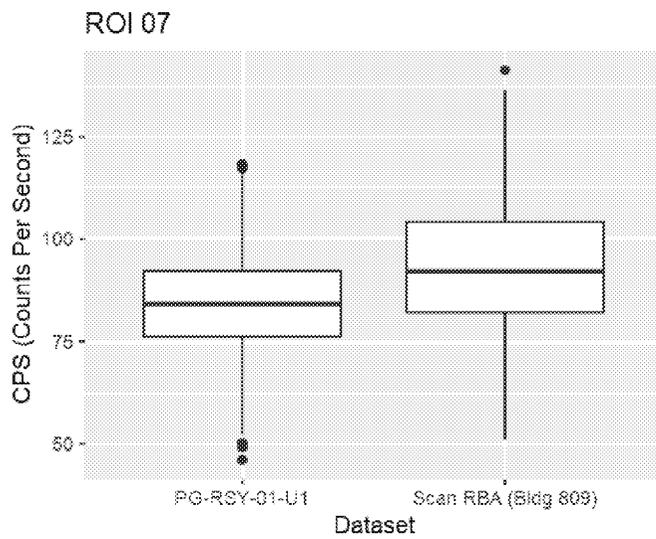
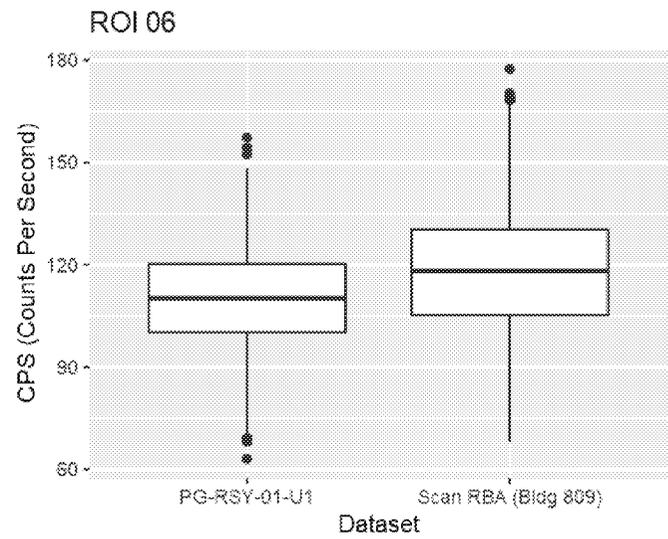
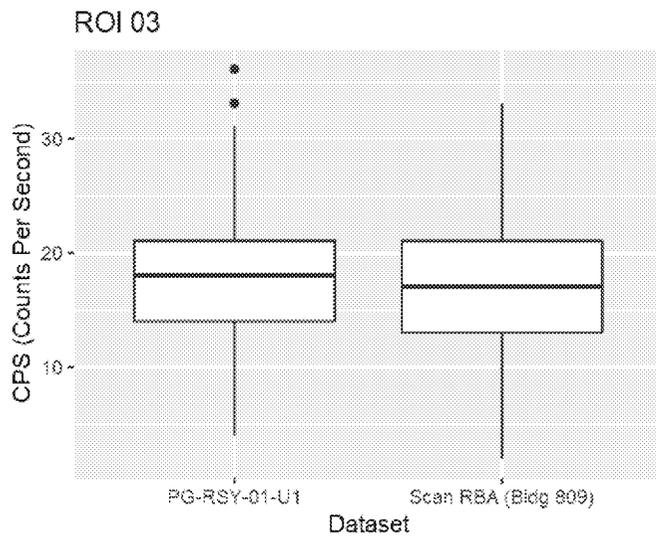
# Soil Scan Statistics

## Histograms



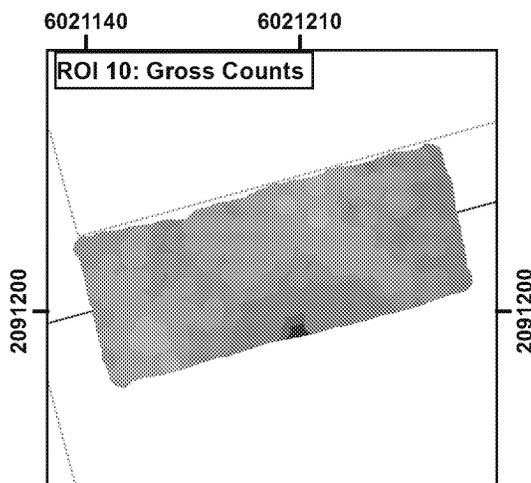
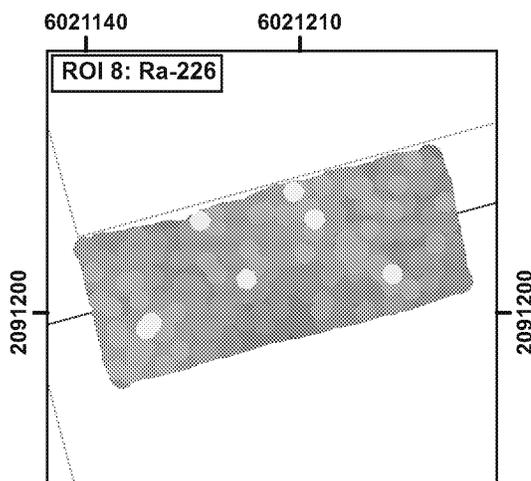
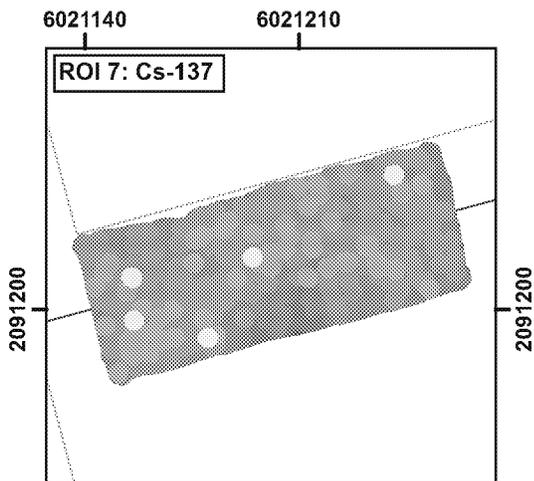
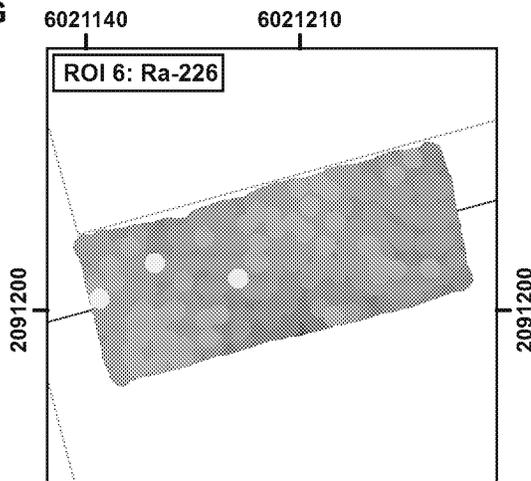
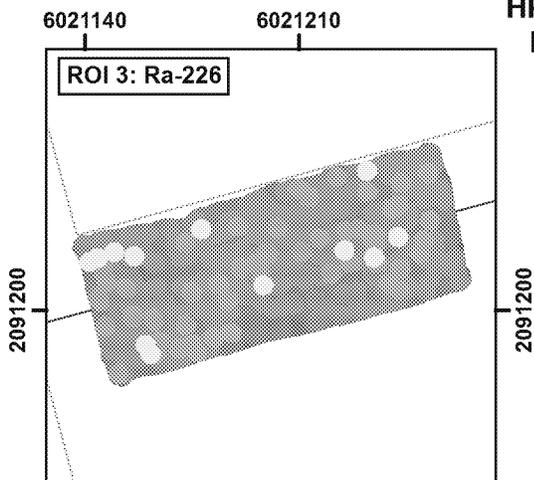
# Soil Scan Statistics

## Box Plots



**RSI Data Plots  
HPNS Parcel G  
RSY 1 Use 1**

TU-077A ESU



**RS 700 Gamma Walkover Survey Data (VD1)**

● > 3 std dev	● > -1 to < 0 std dev
● > 2 to < 3 std dev	● > -2 to < -1 std dev
● > 1 to < 2 std dev	● > -3 to < -2 std dev
● > 0 to < 1 std dev	● < -3 std dev

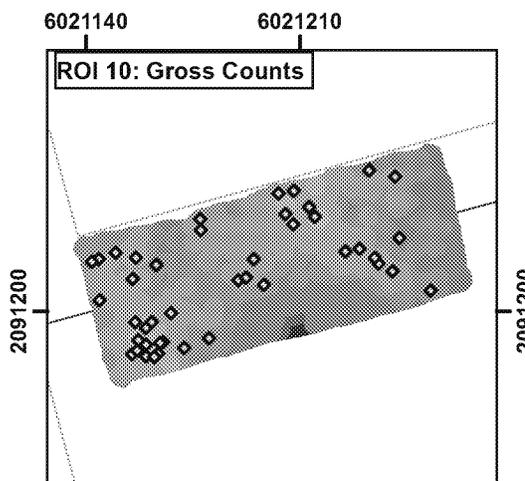
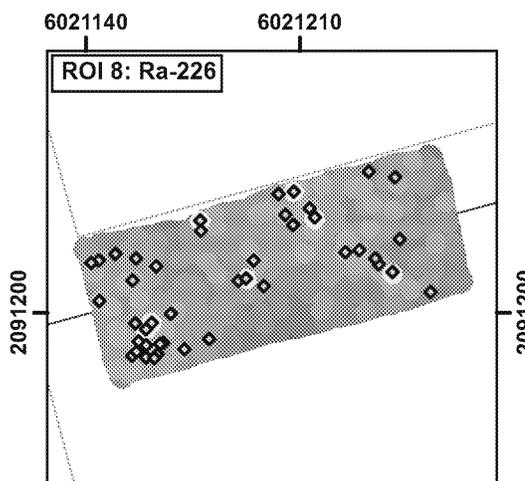
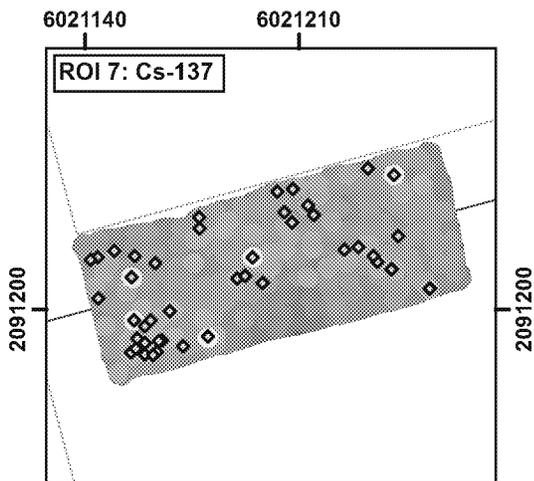
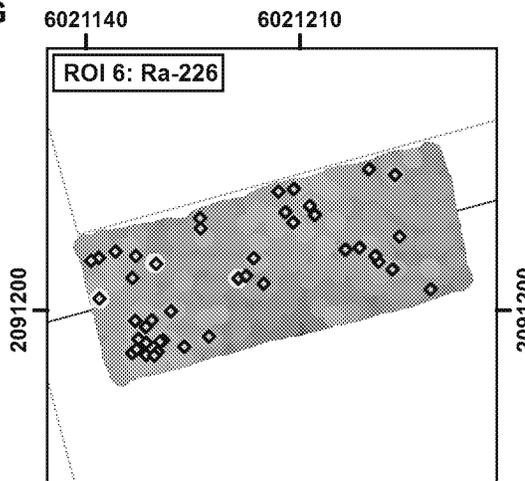
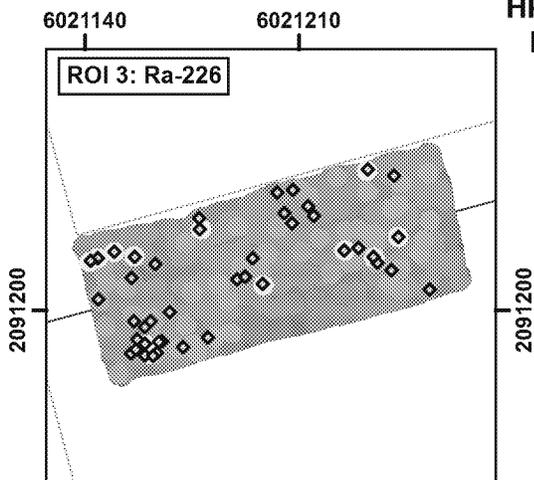
0 25 50 100 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot

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**RSI Data Plots  
HPNS Parcel G  
RSY 1 Use 1**

TU-077A ESU



**RS 700 Gamma Walkover Survey Data (VD1)**

◆ Follow-Up Locations	● > -1 to < 0 std dev
● > 3 std dev	● > -2 to < -1 std dev
● > 2 to < 3 std dev	● > -3 to < -2 std dev
● > 1 to < 2 std dev	● < -3 std dev
● > 0 to < 1 std dev	

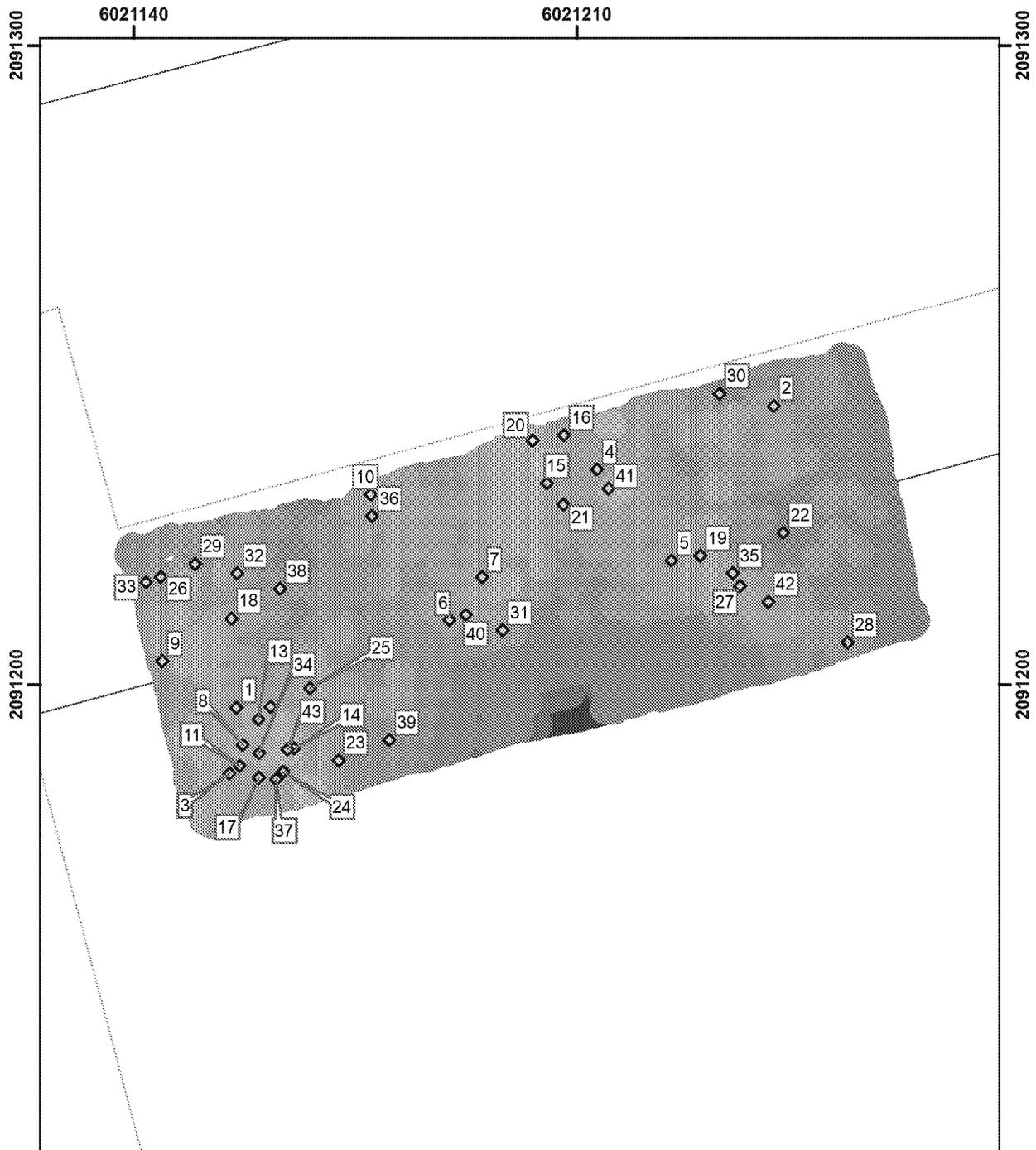
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**Follow-Up Static Survey  
HPNS Parcel G  
RSY 1 Use 1**

TU-077A ESU



**RSY 1 Use 1 (VD1, ROI 10 Gross Gamma)**

◆ Follow-Up Locations	● > 1 to < 2 std dev	● > -2 to < -1 std dev
● > 3 std dev	● > 0 to < 1 std dev	● > -3 to < -2 std dev
● > 2 to < 3 std dev	● > -1 to < 0 std dev	● < -3 std dev

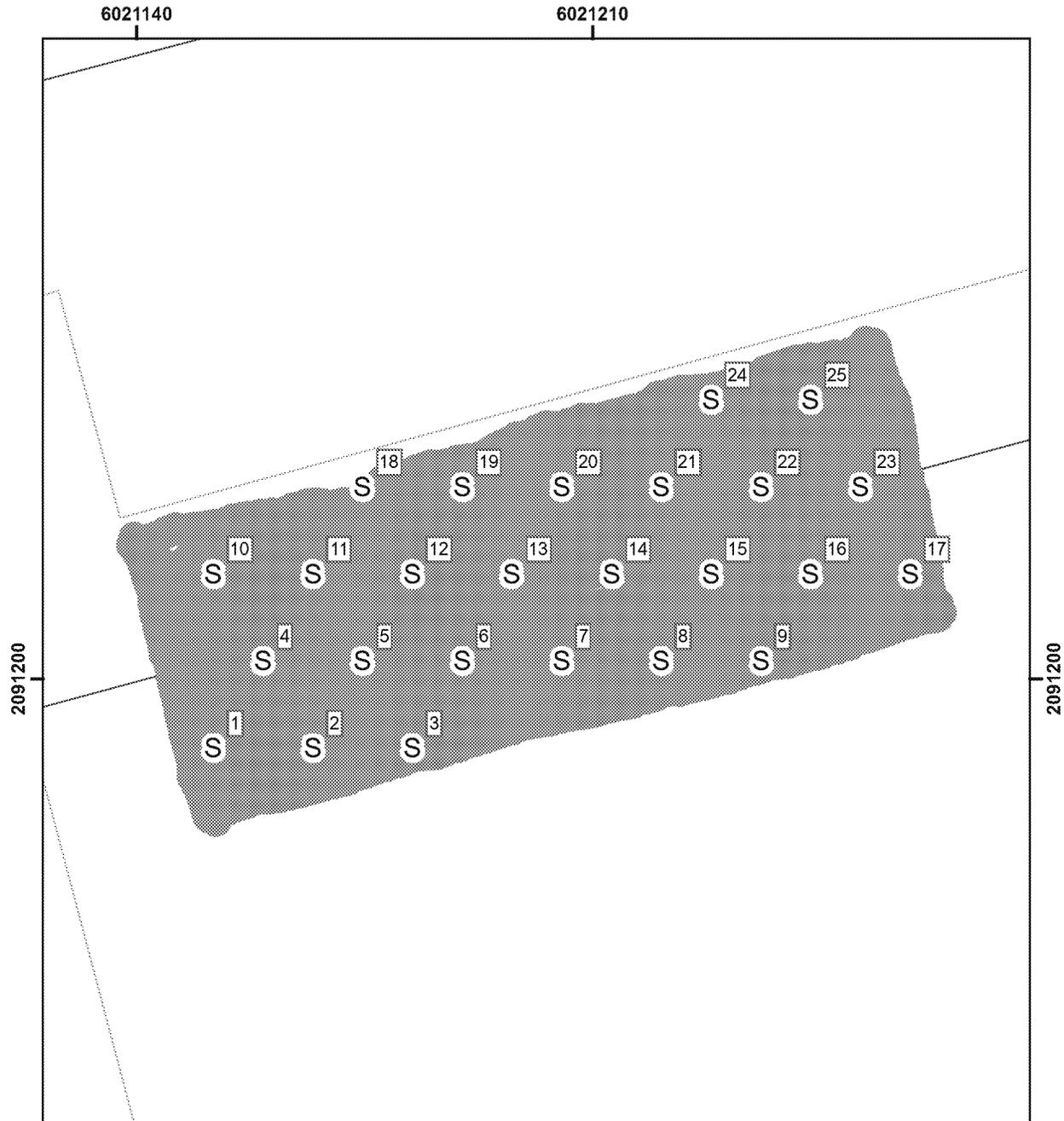
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### Systematic Sampling HPNS Parcel G RSY 1 Use 1

TU-077A ESU



#### RSY 1 Use 1

S Systematic Sample Locations

● RS-700 GWS Coverage

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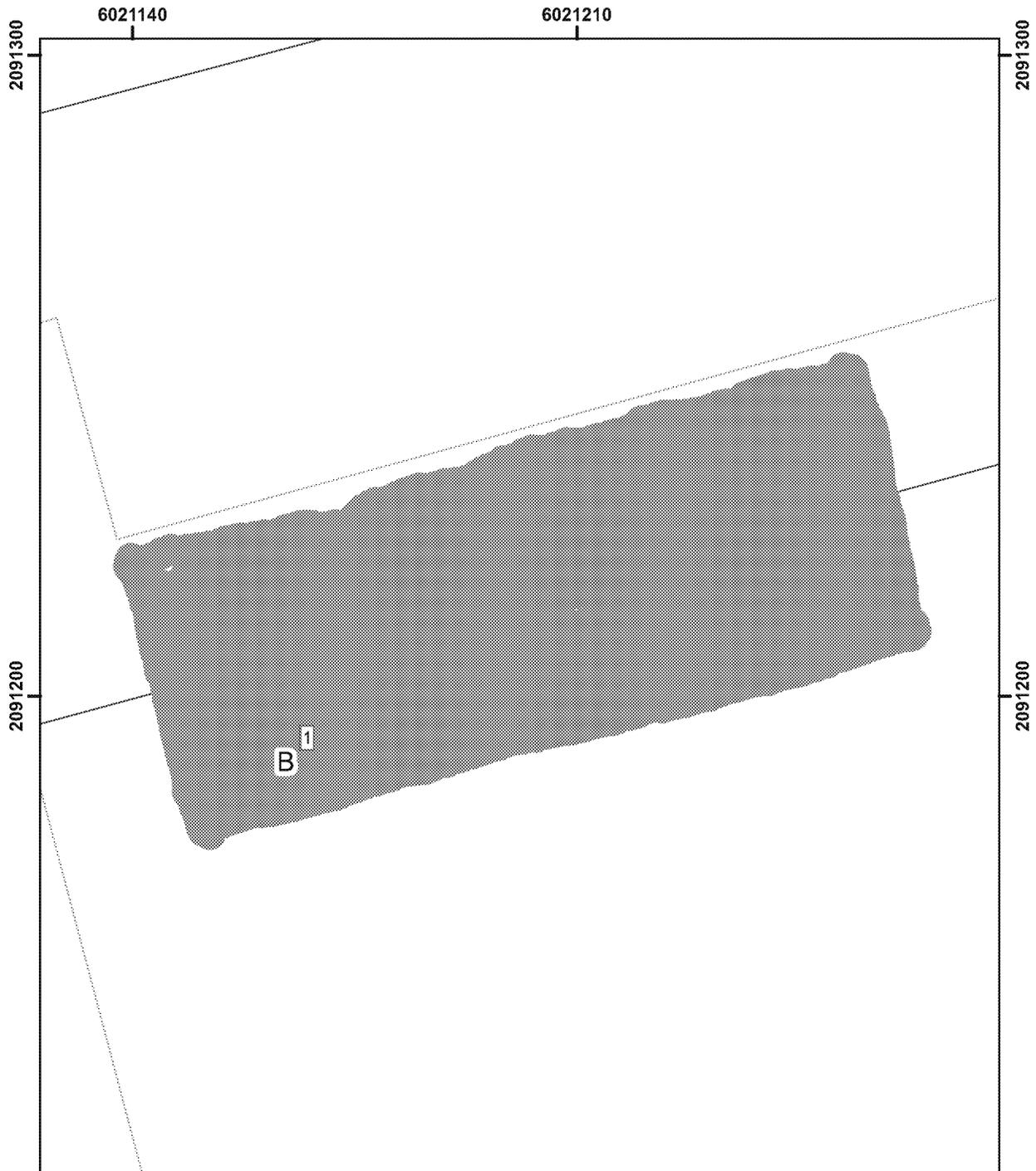


Coordinate system: CSP Zone III, NAD83, US Survey Foot



### Biased Sampling HPNS Parcel G RSY 1 Use 1

TU-077A ESU



#### RSY 1 Use 1

- B** Biased Sample Location
-  RS-700 GWS Coverage

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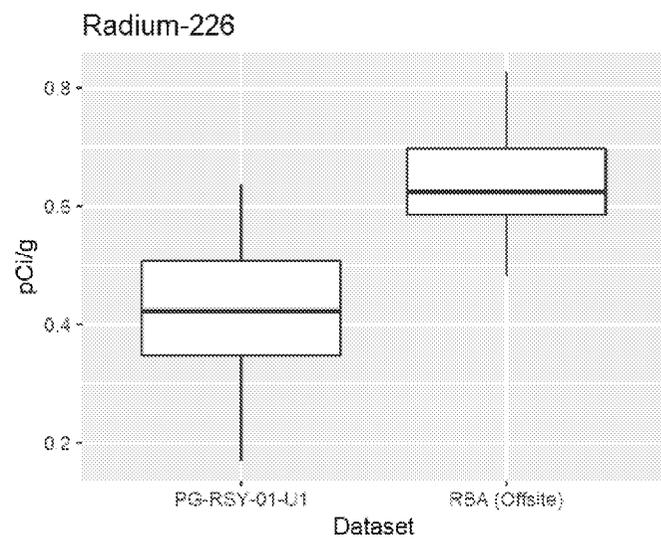
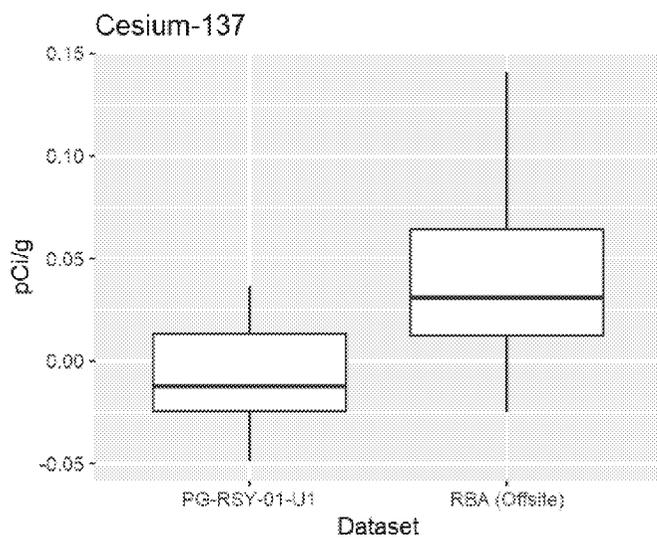
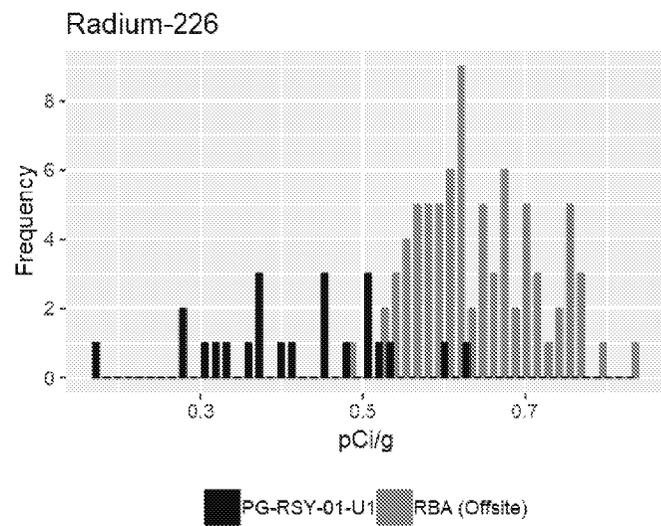
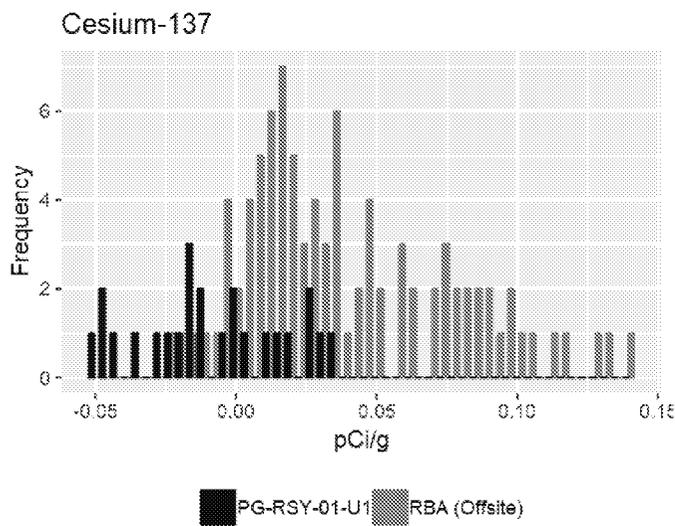
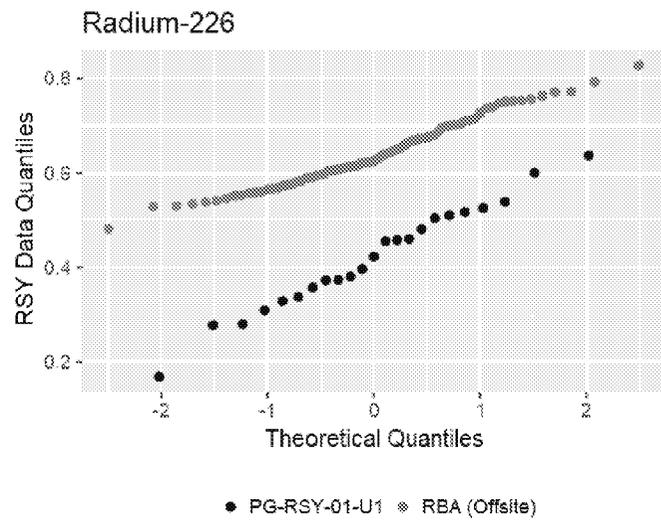
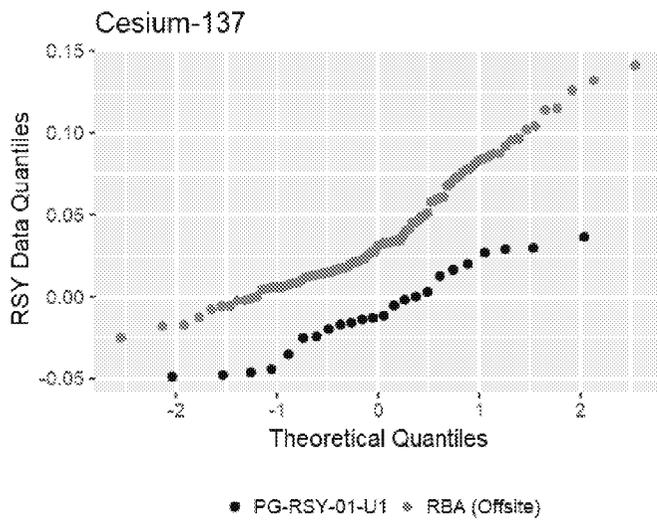


Coordinate system: CSP Zone III, NAD83, US Survey Foot

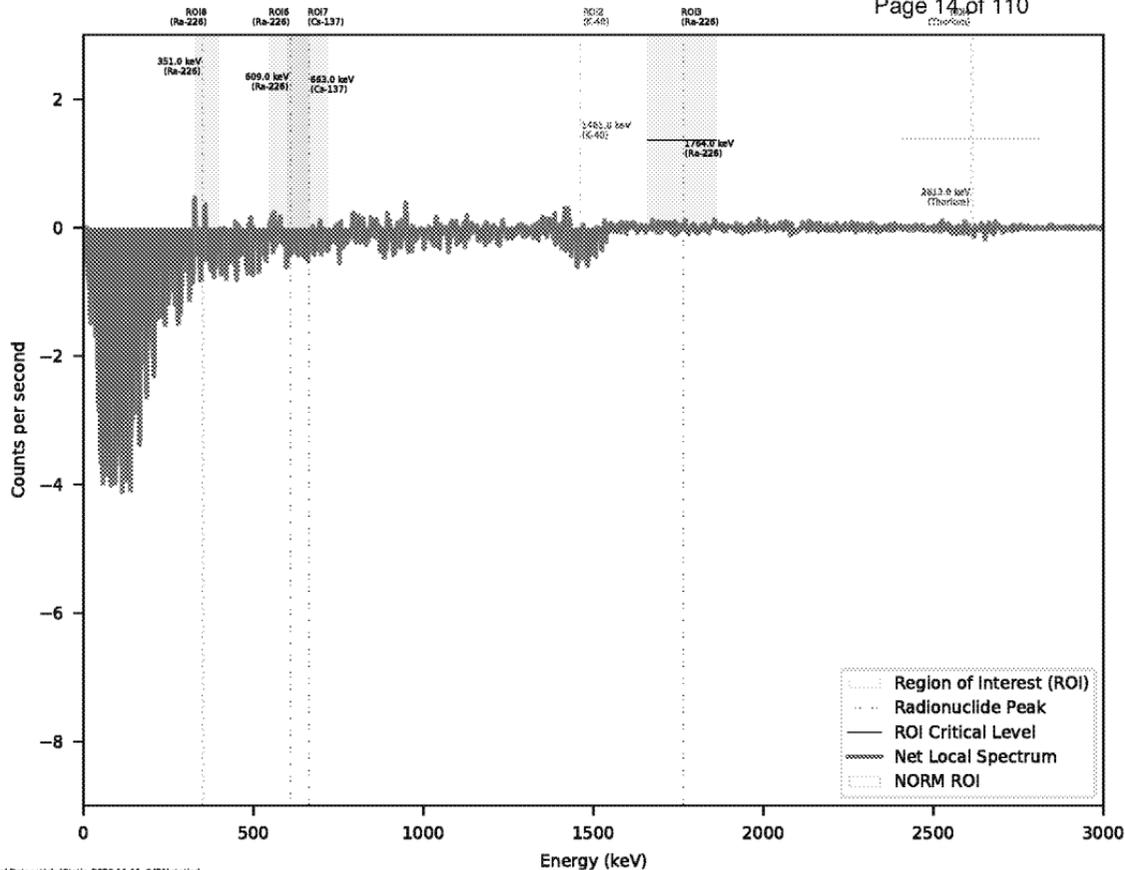


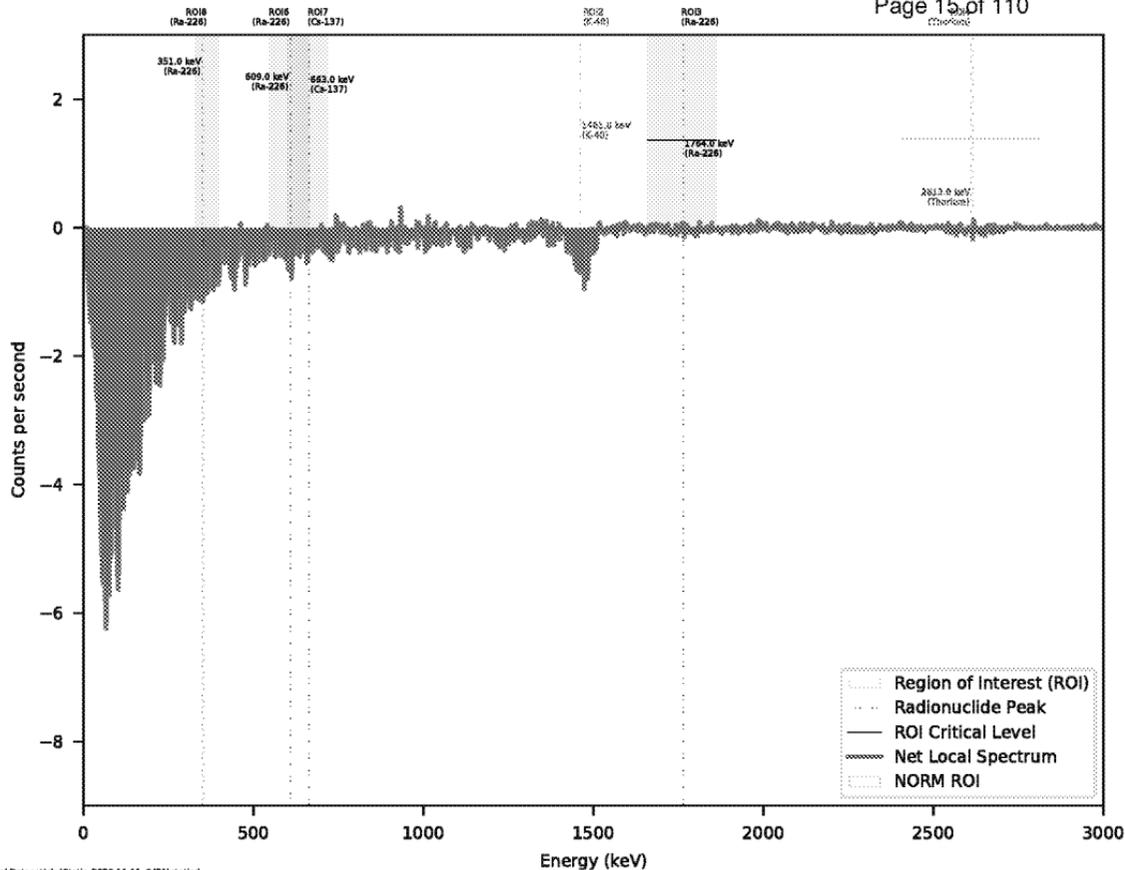
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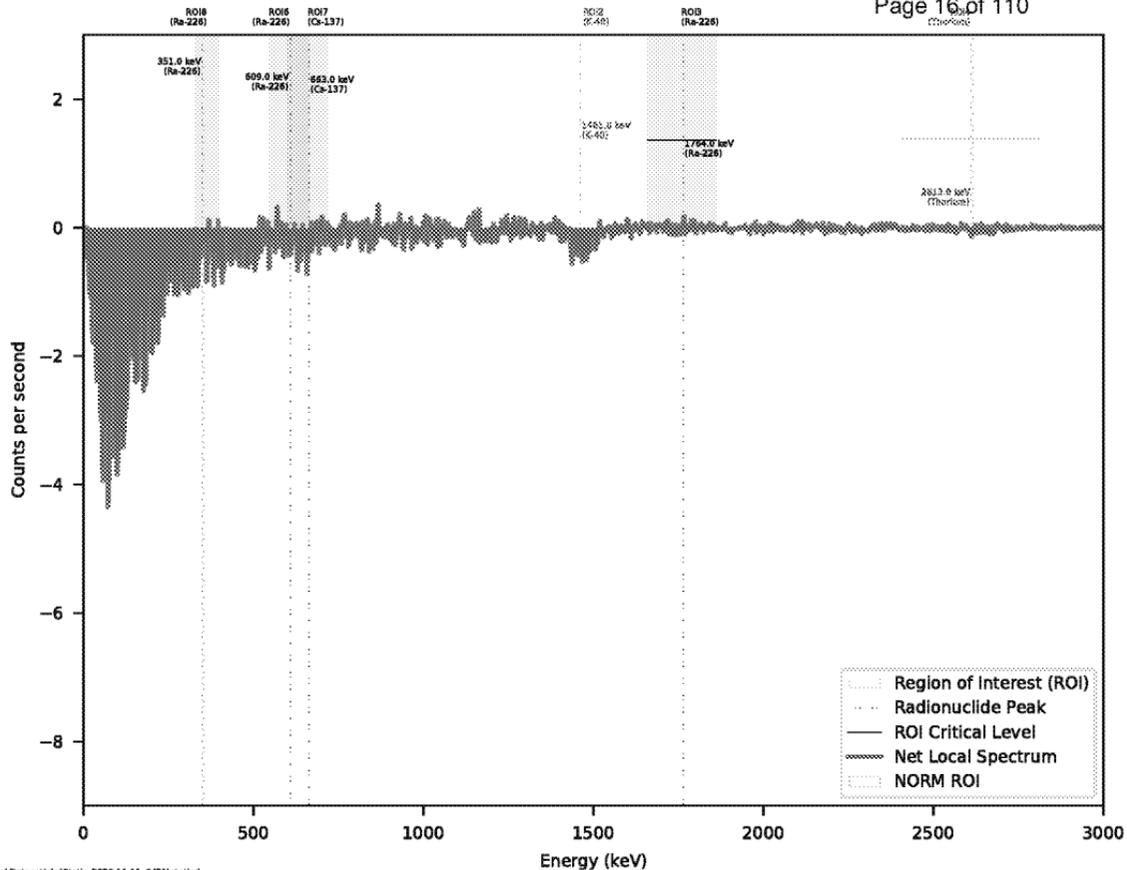
# Soil Sample Statistics

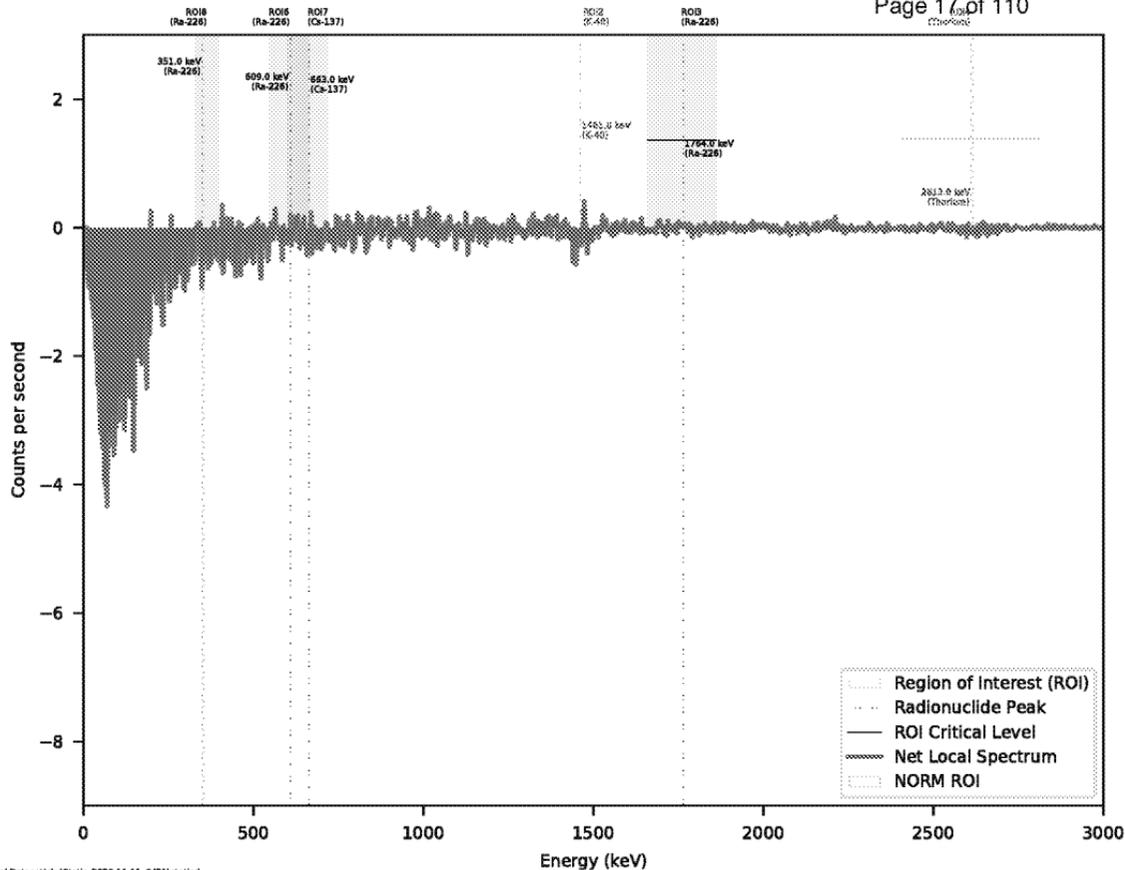


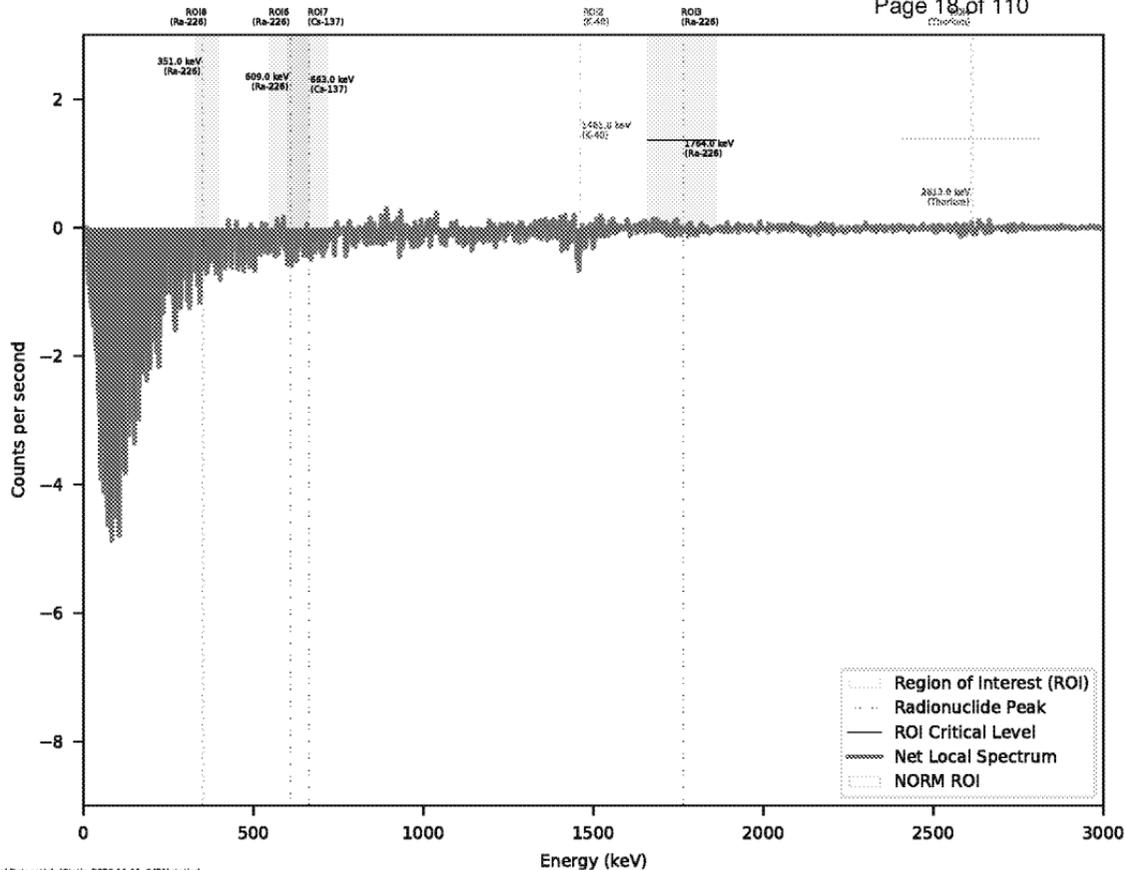


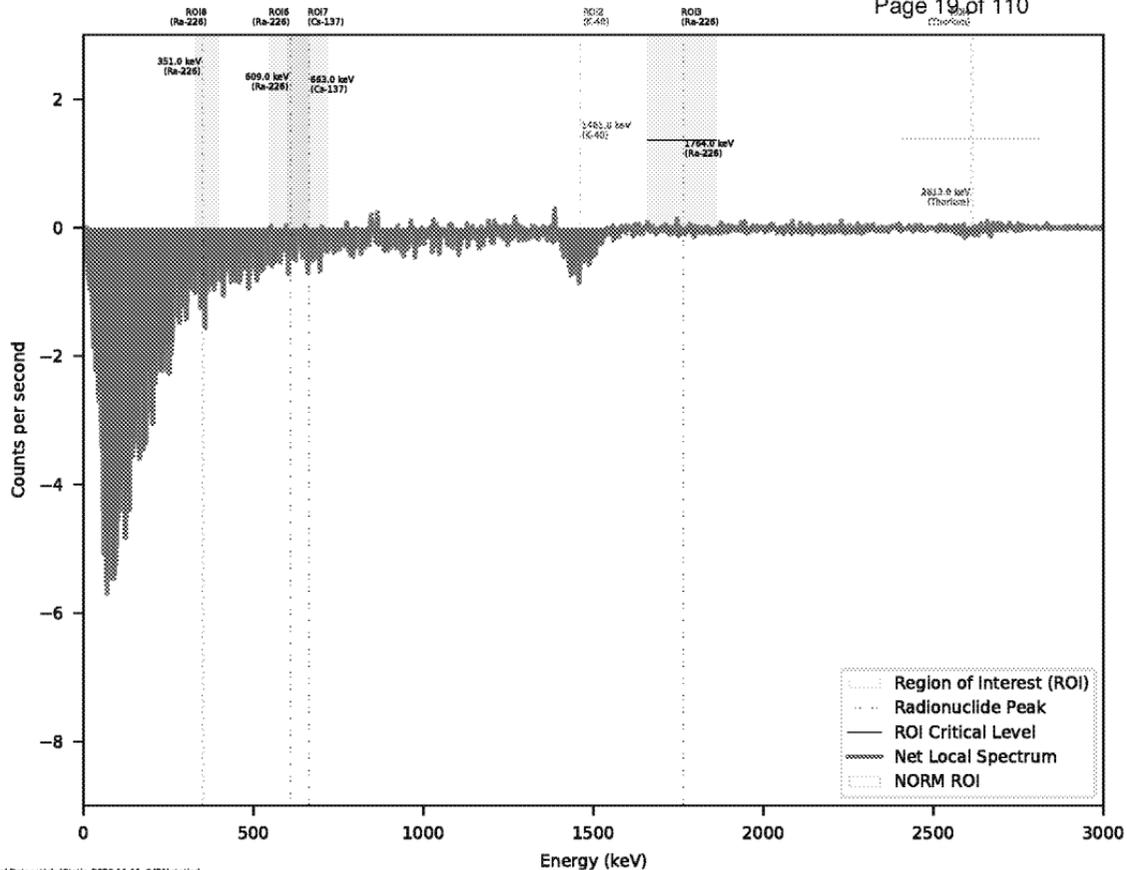


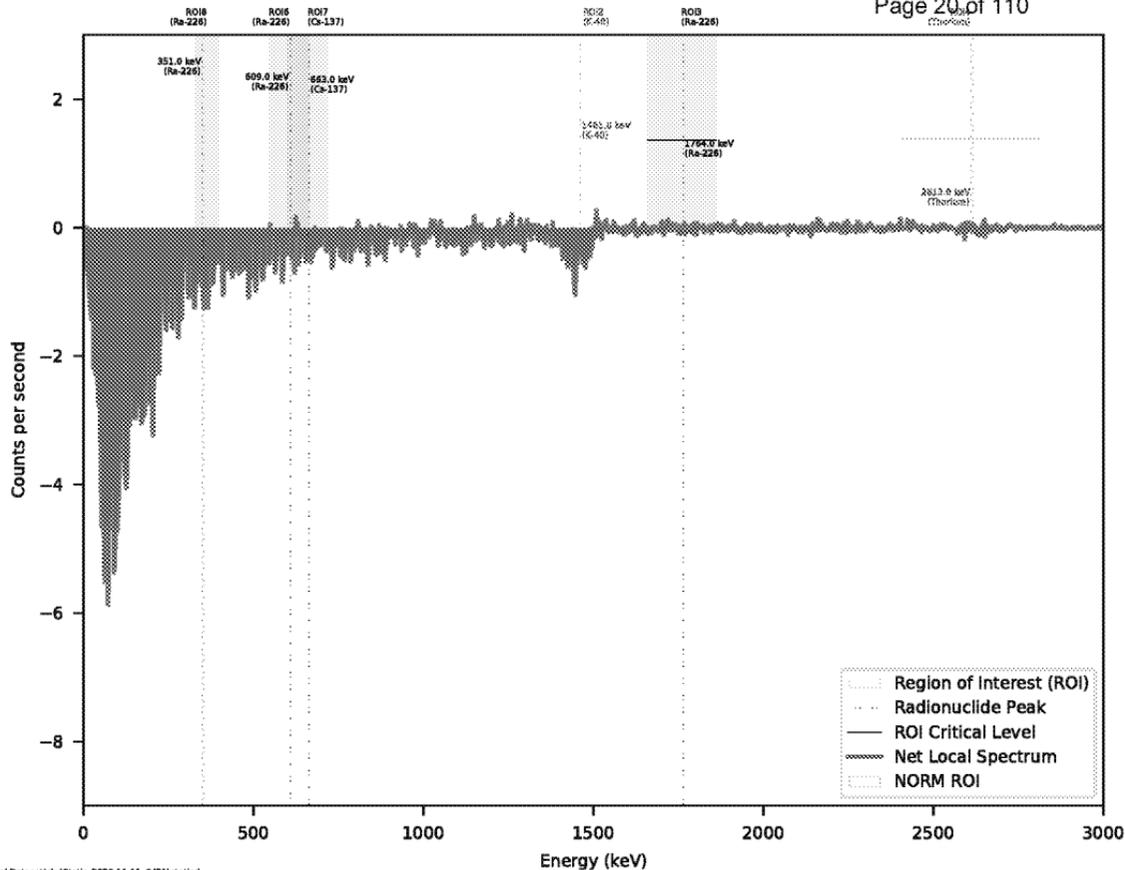


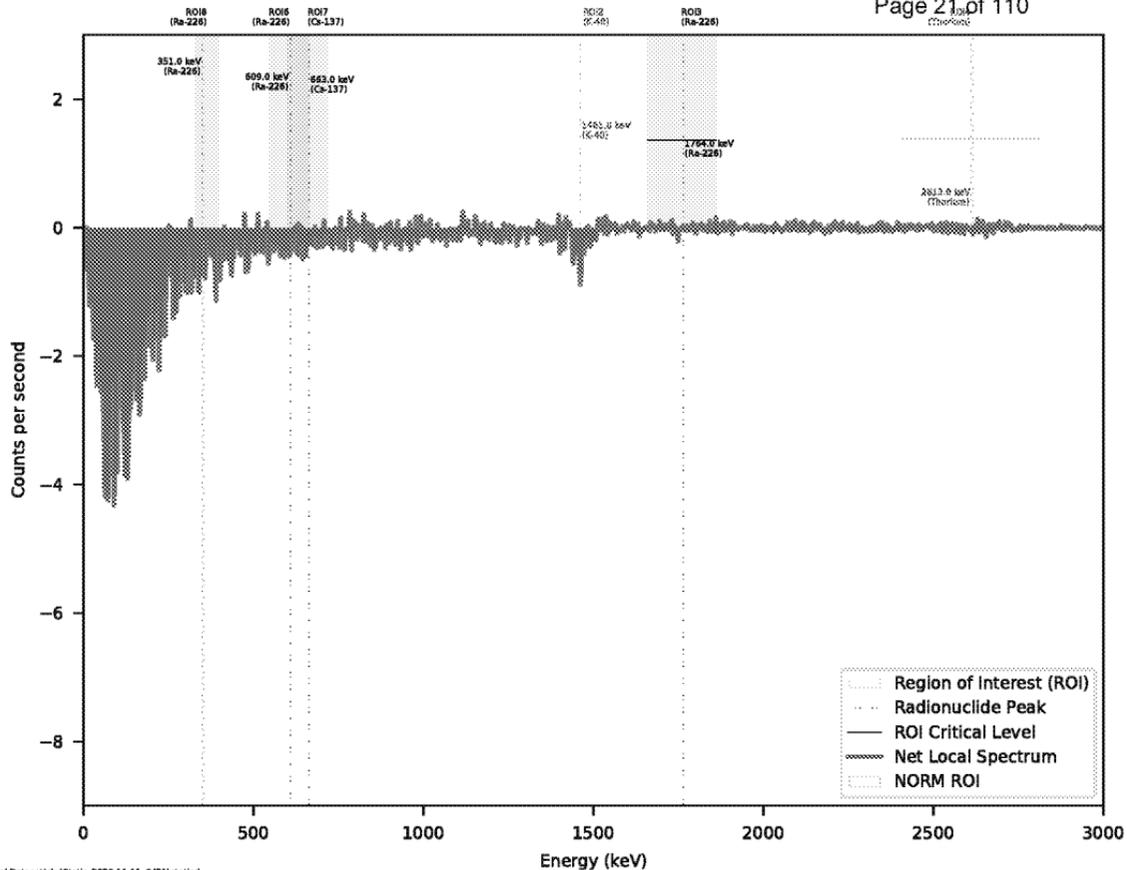


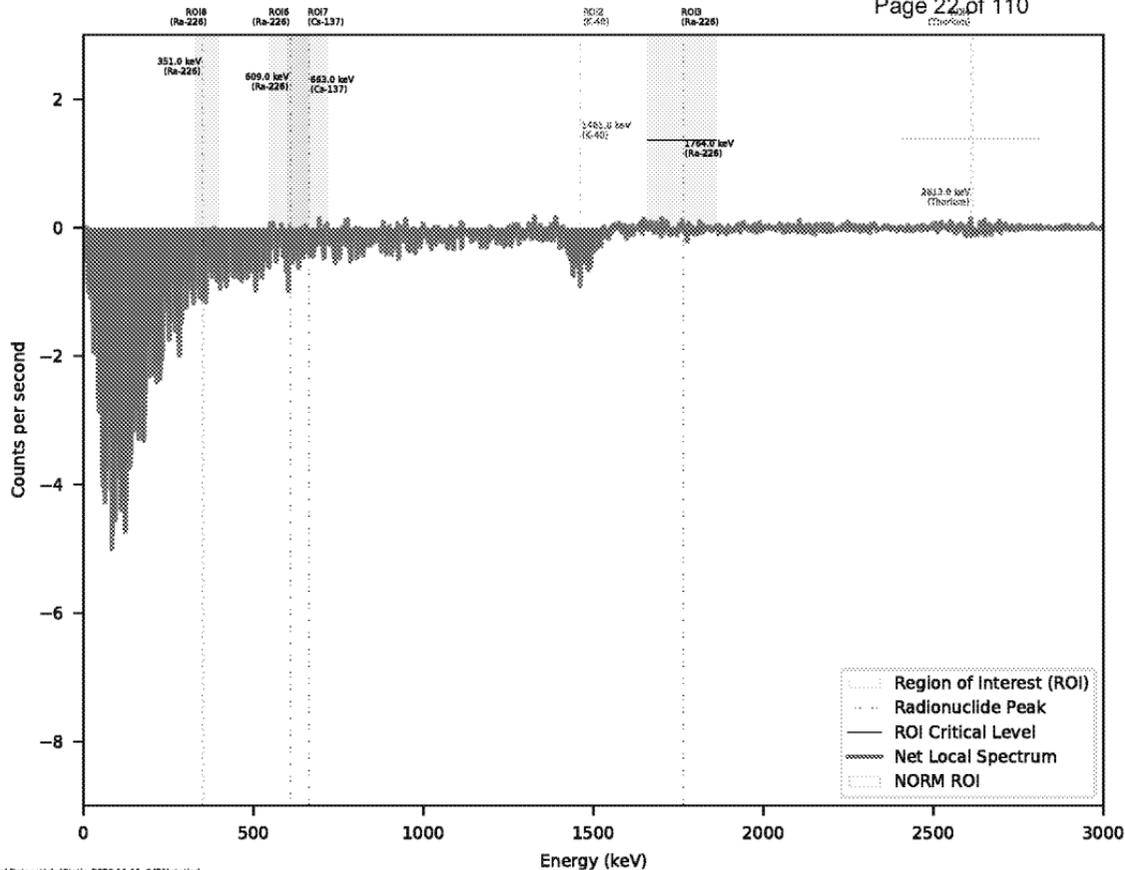


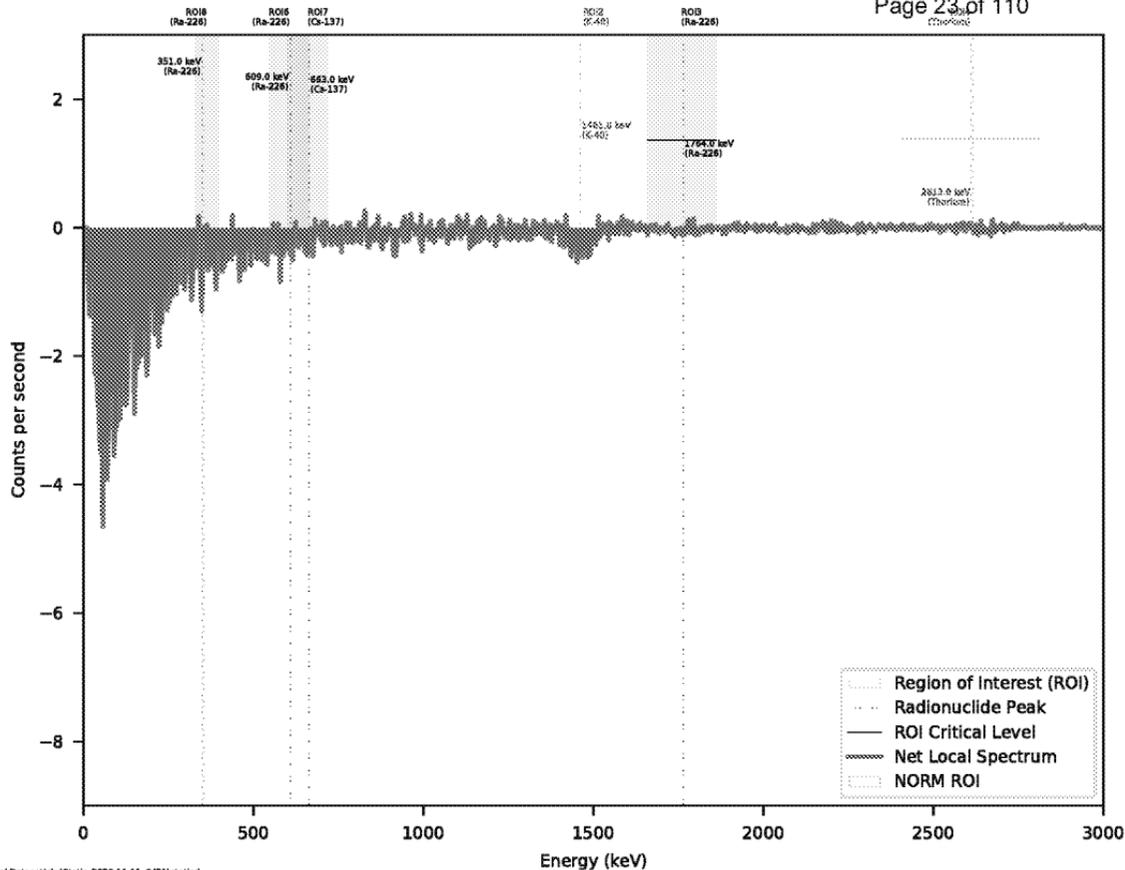


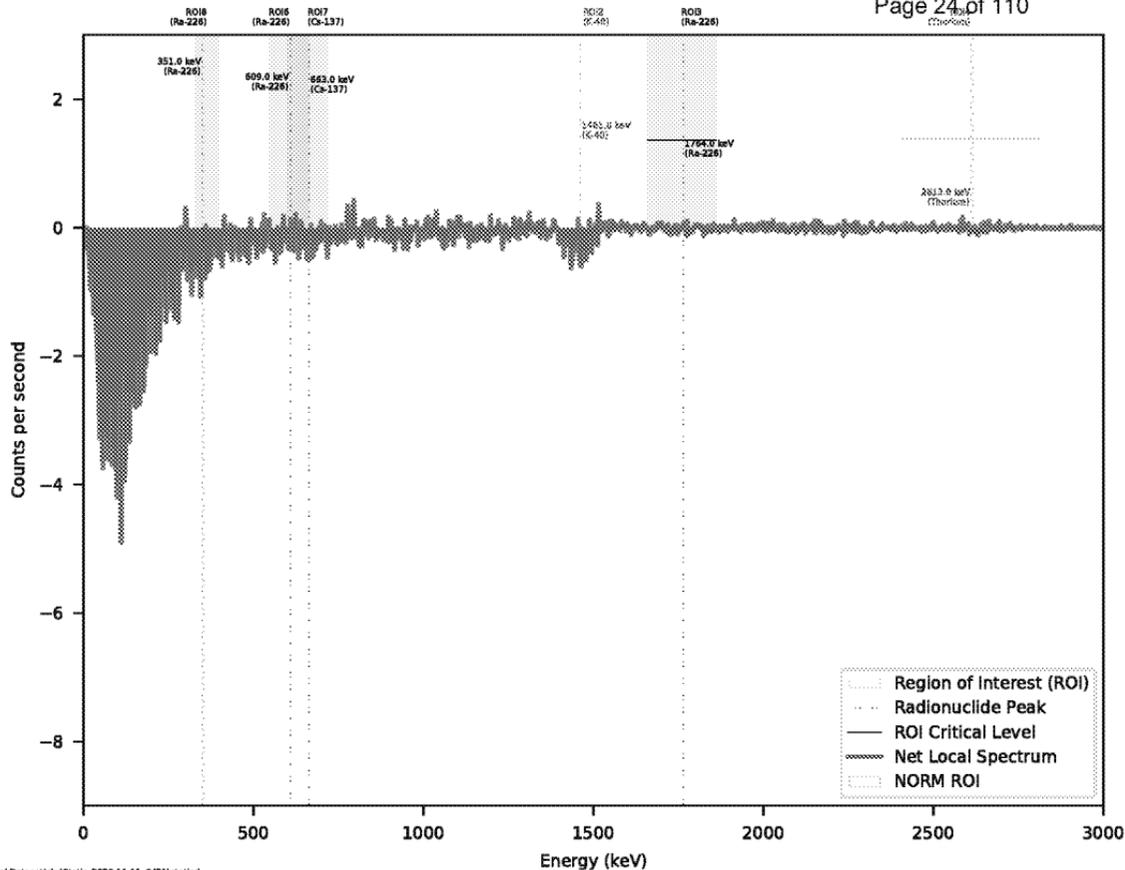


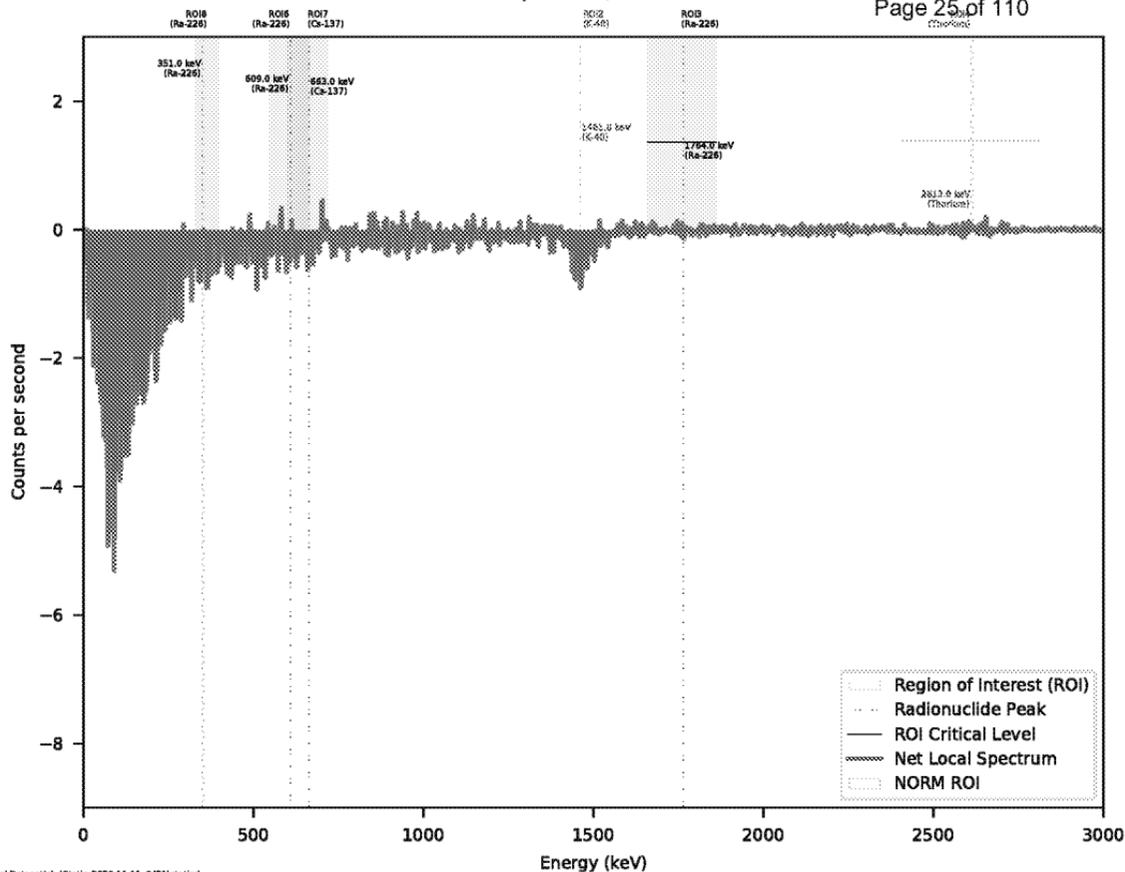


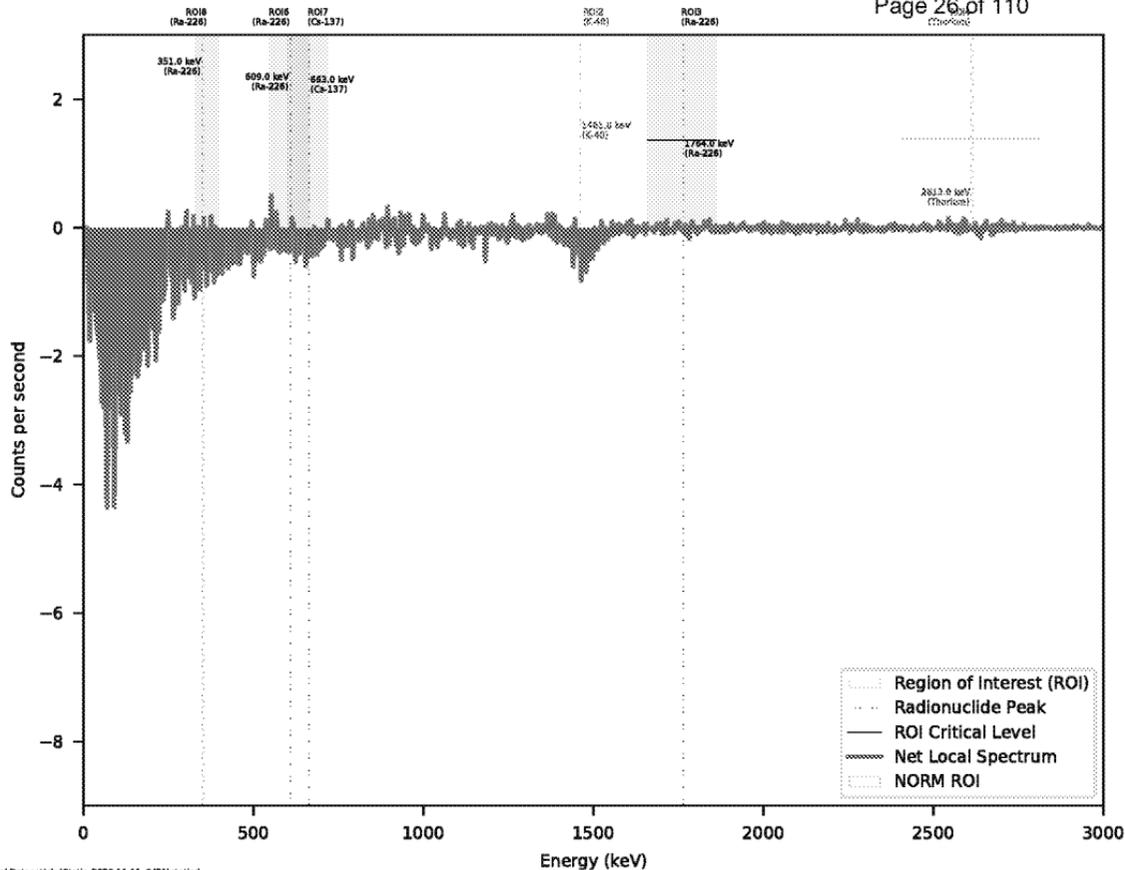


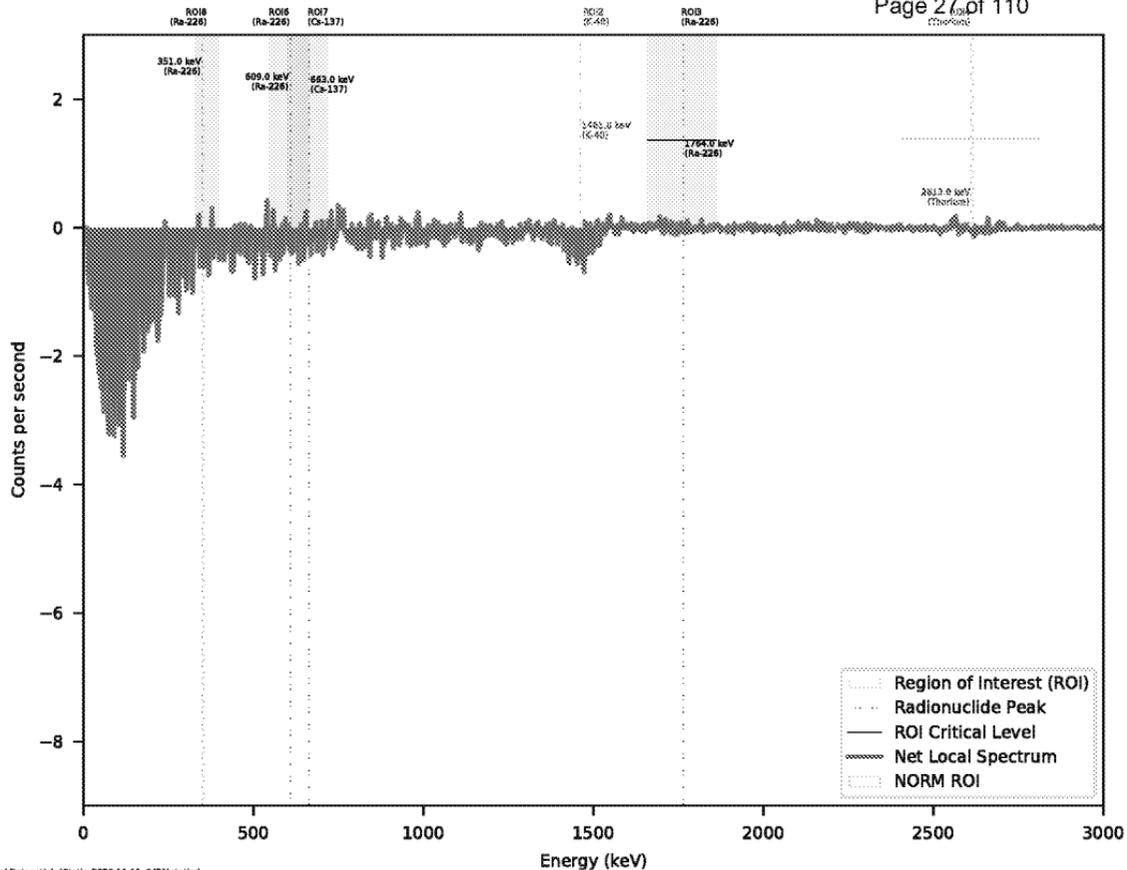


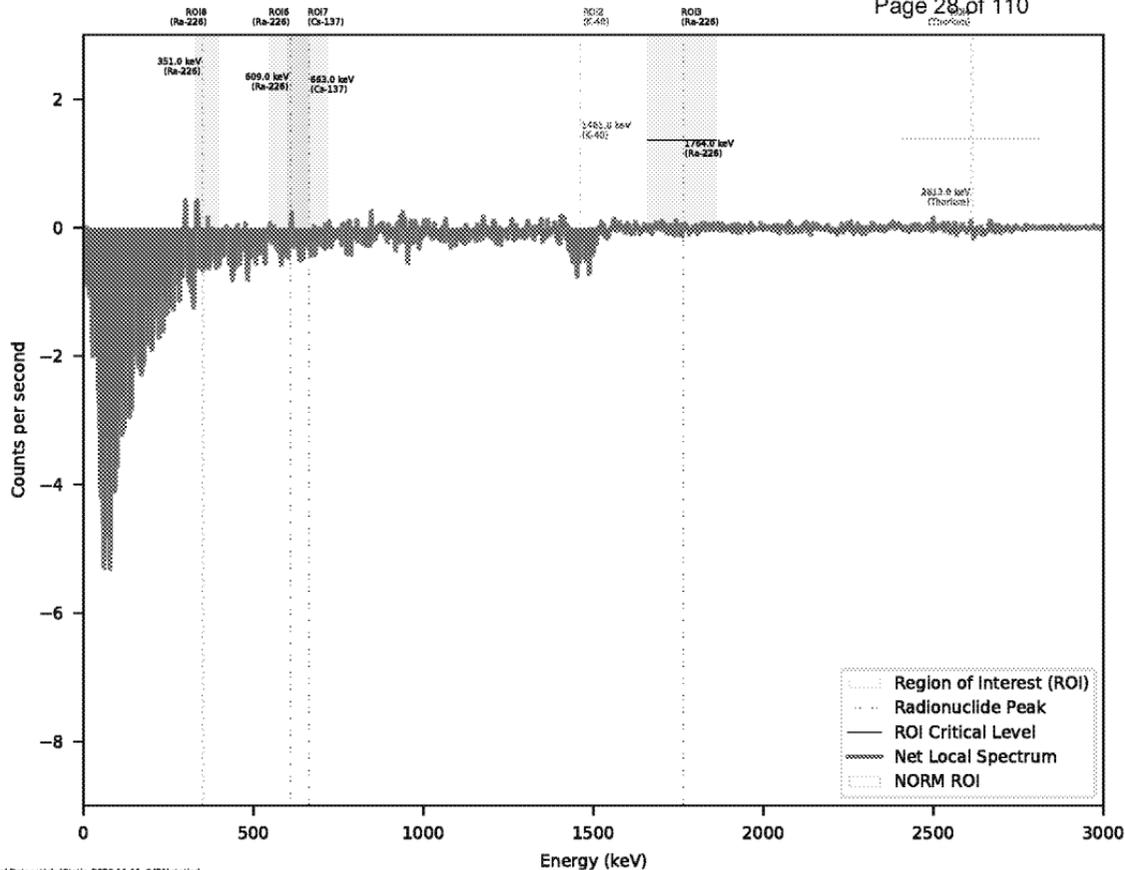


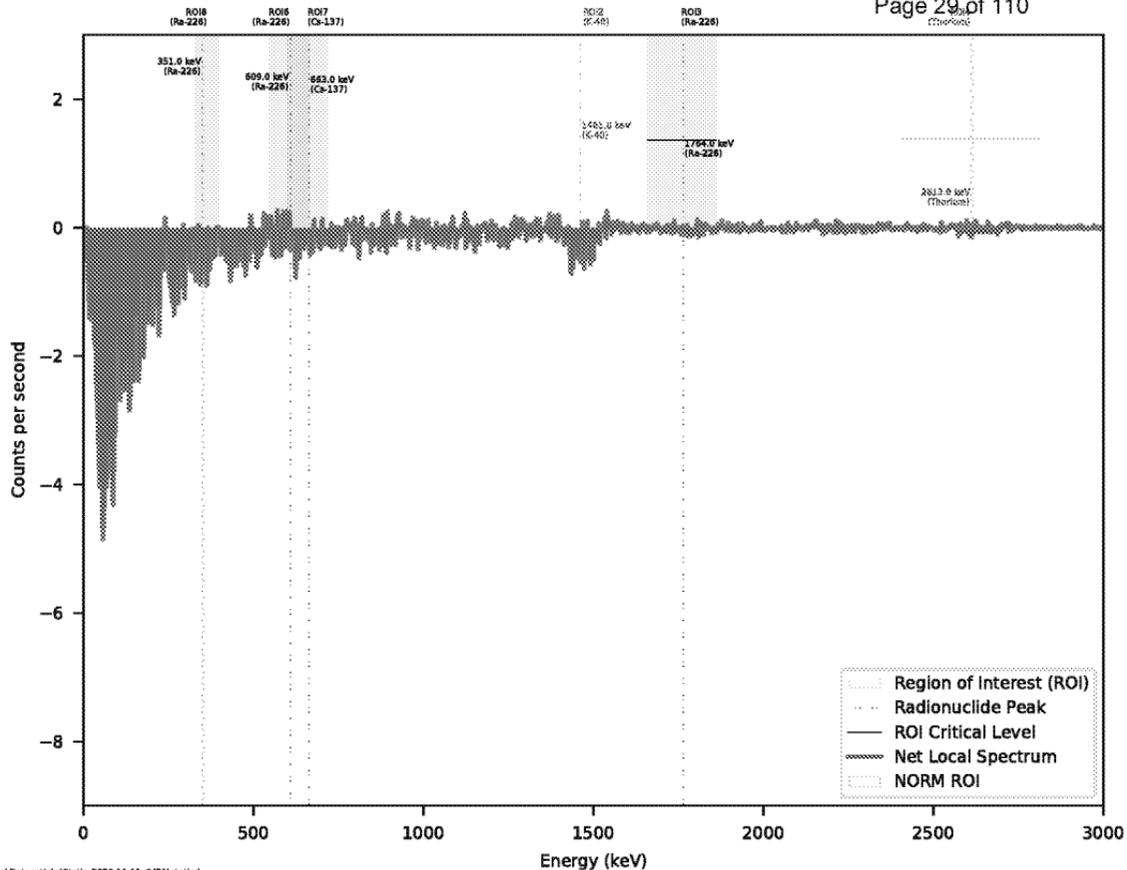


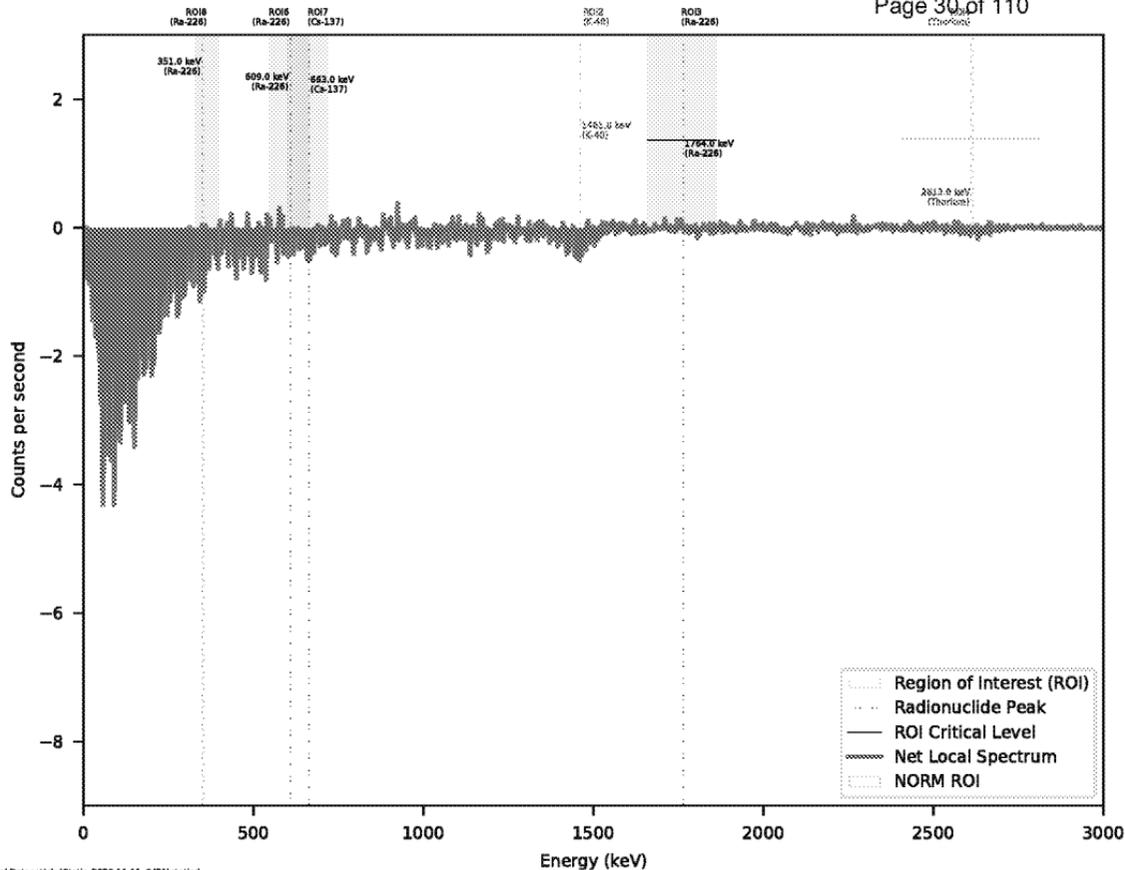


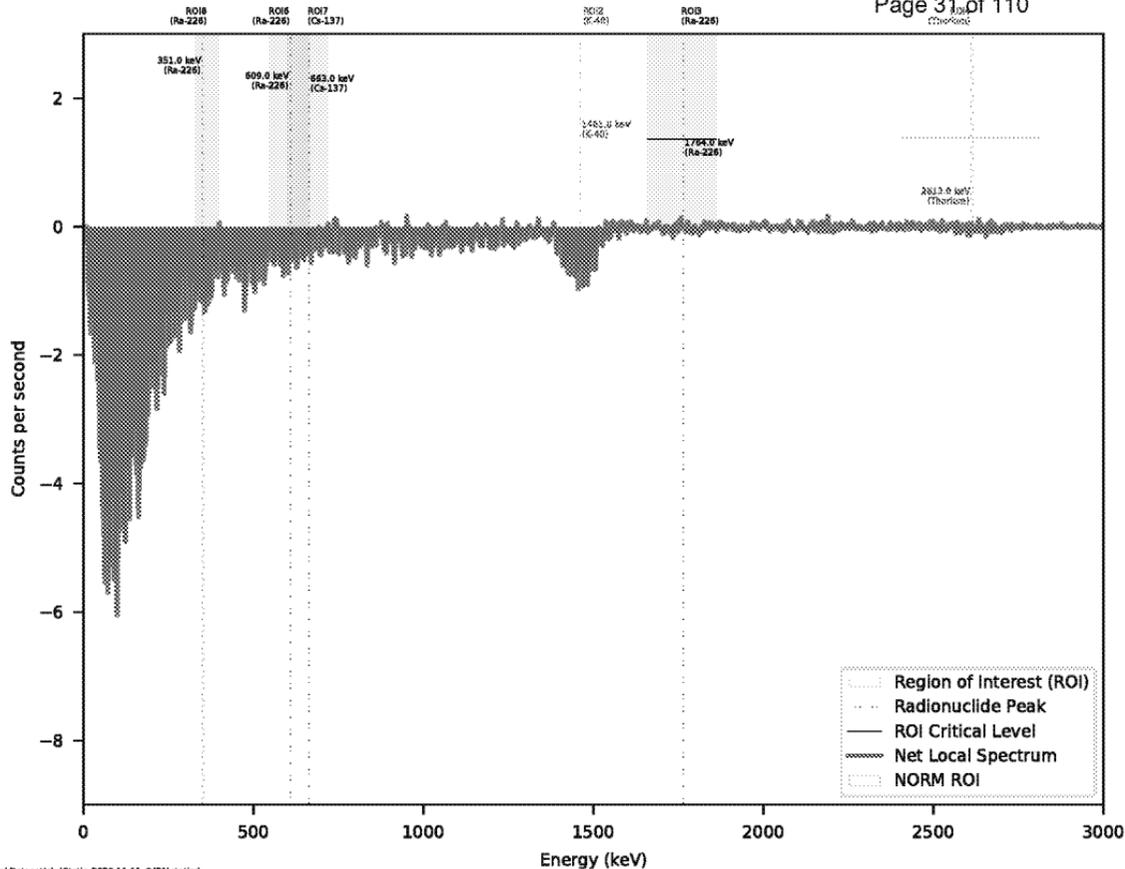


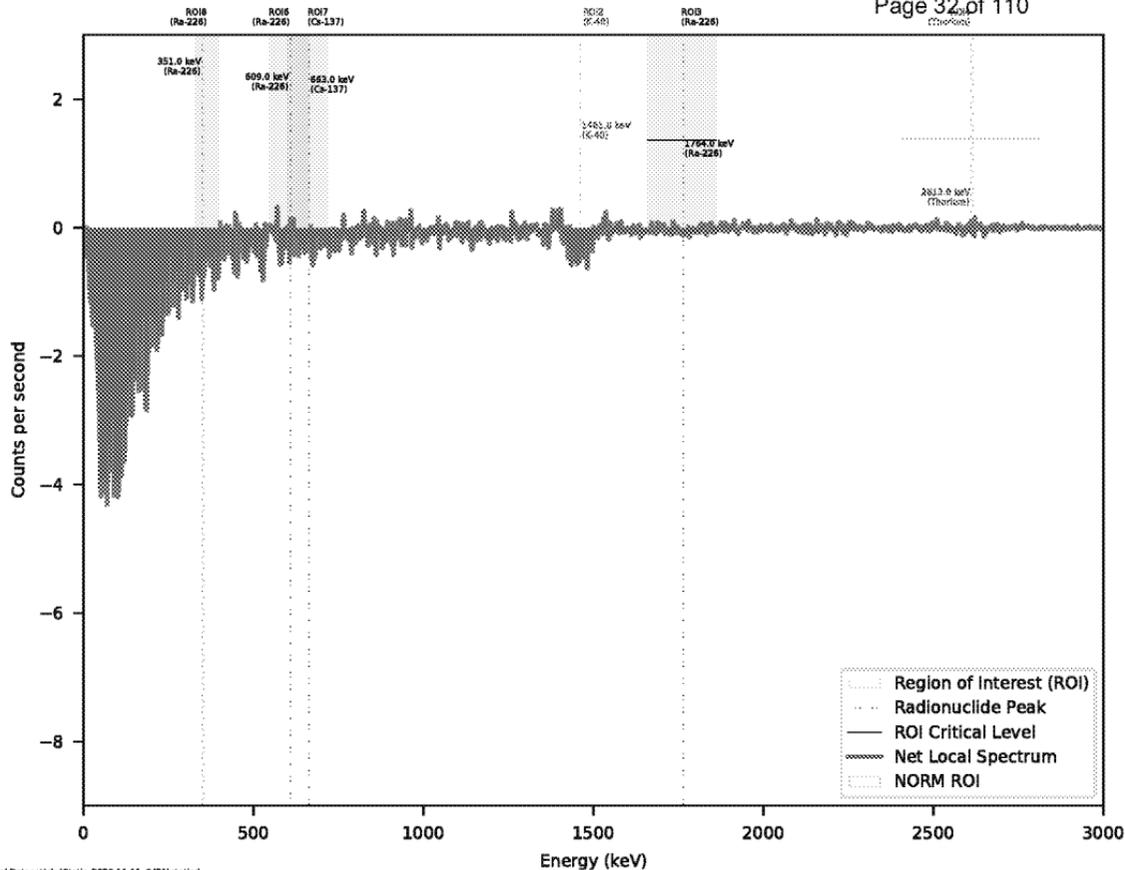


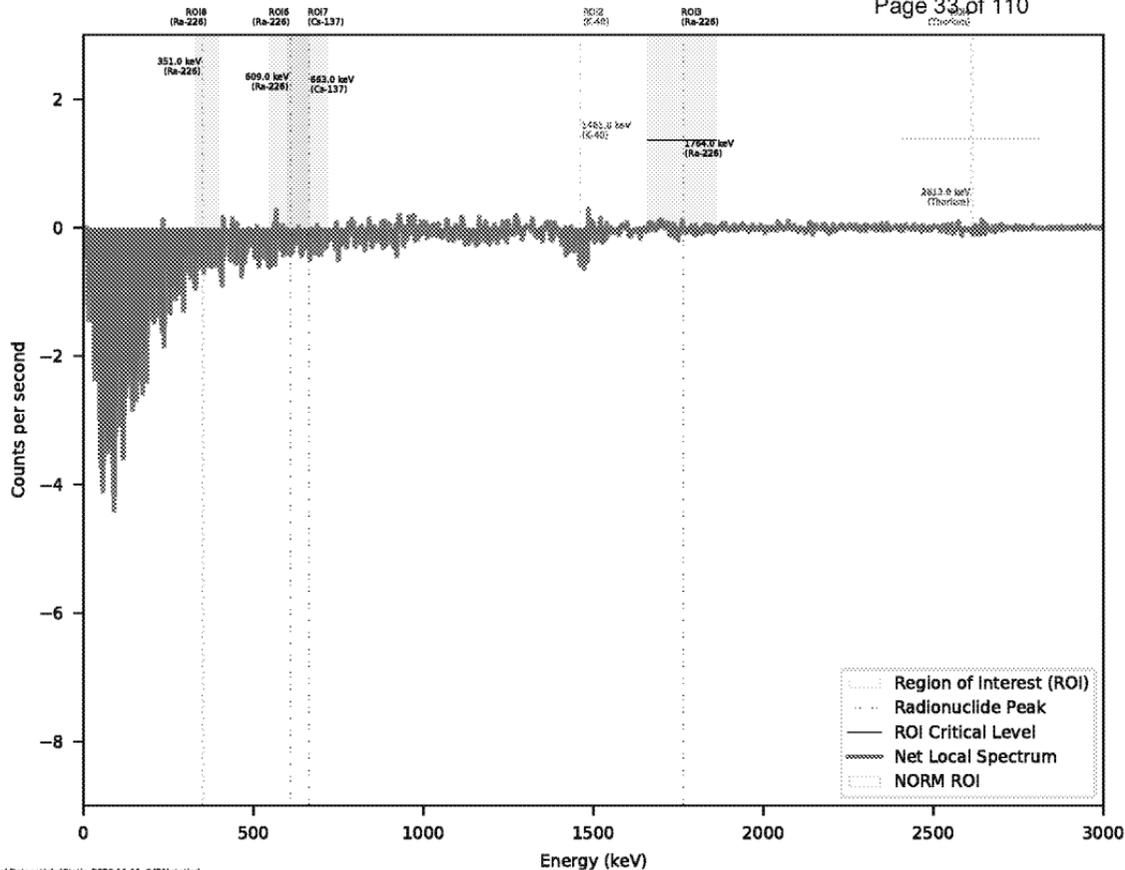


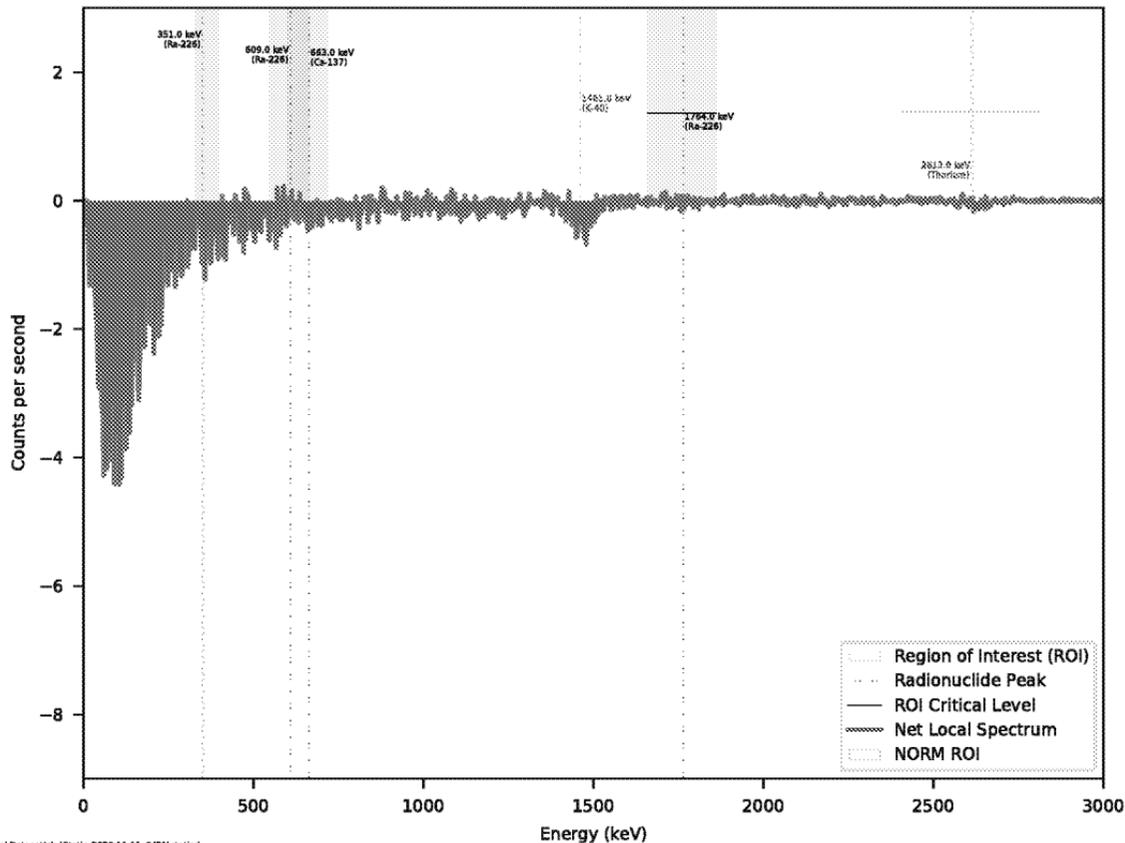


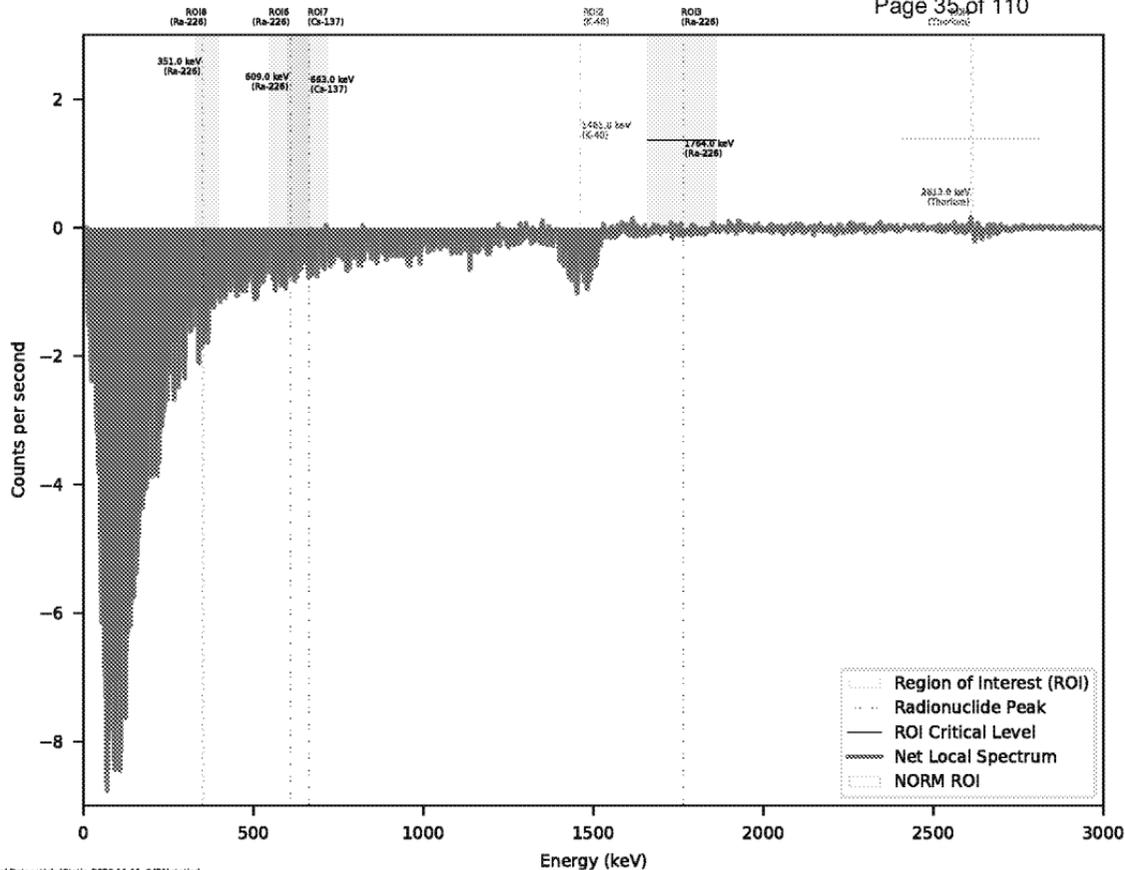


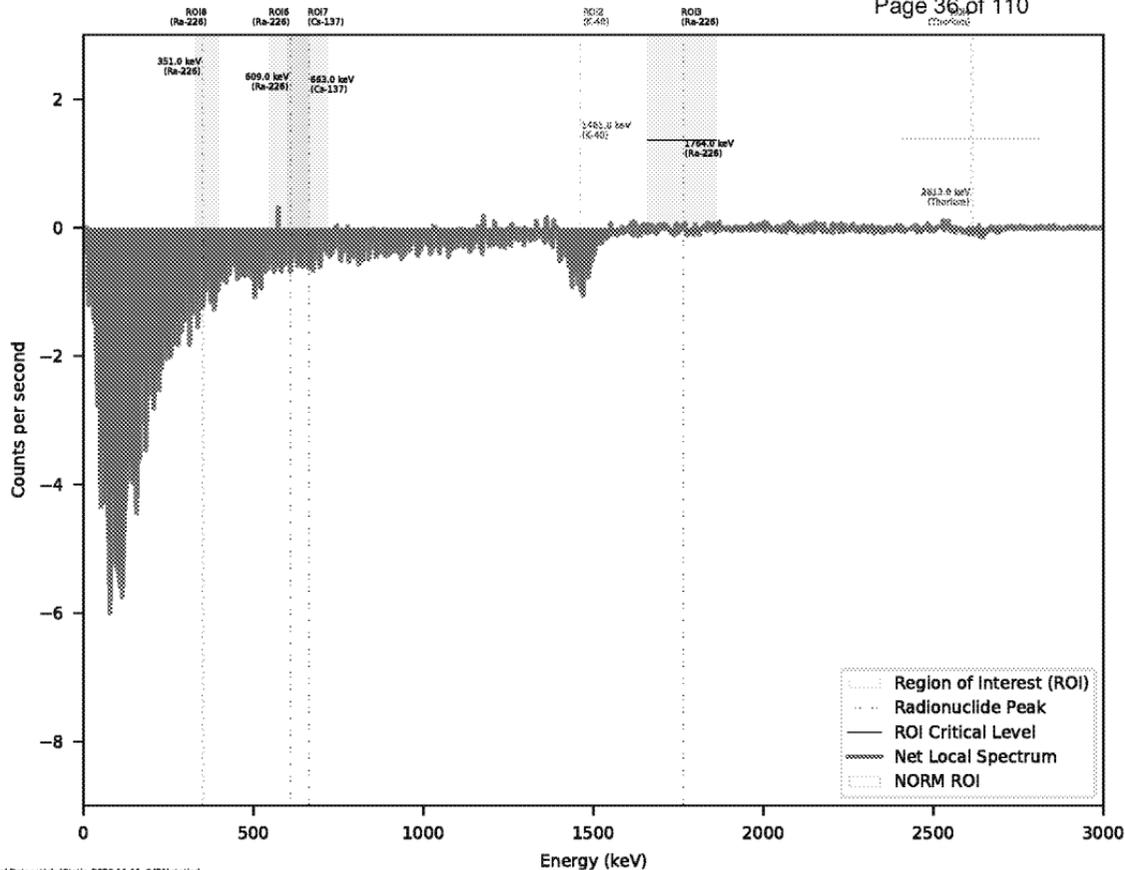


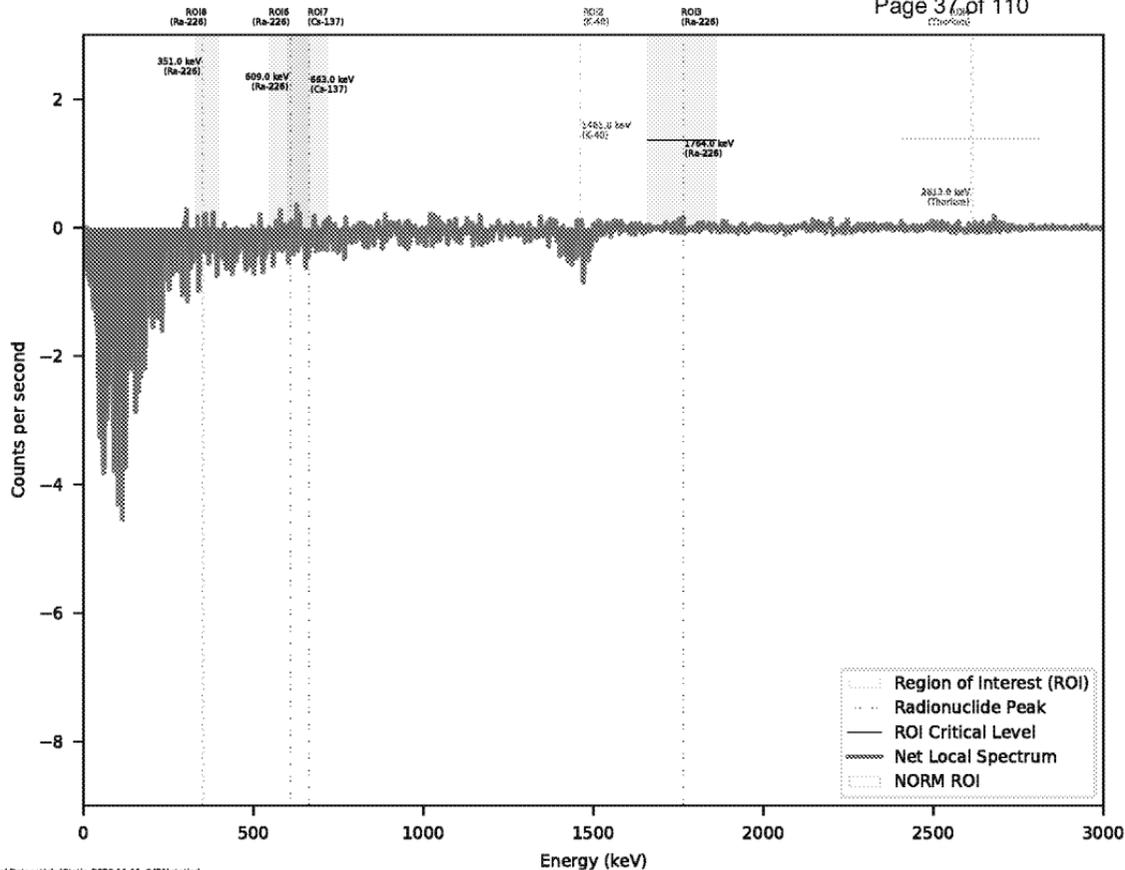


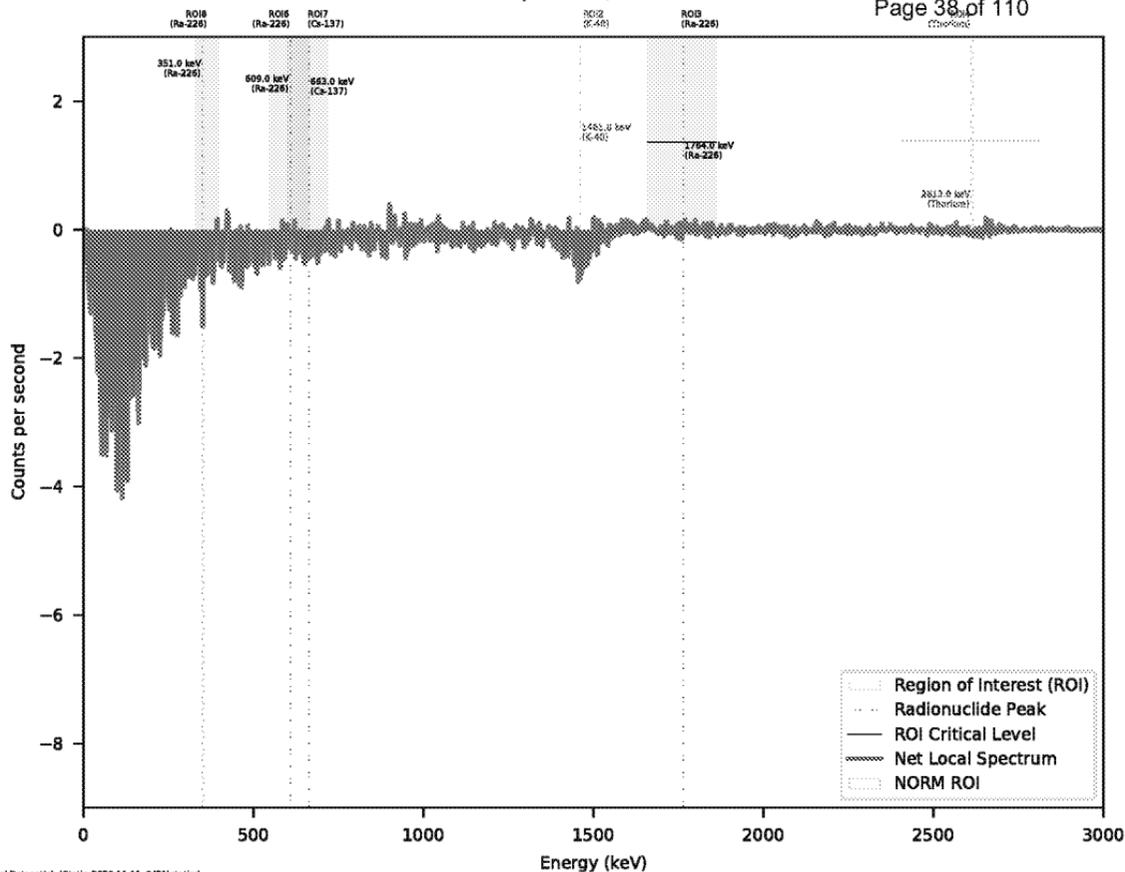


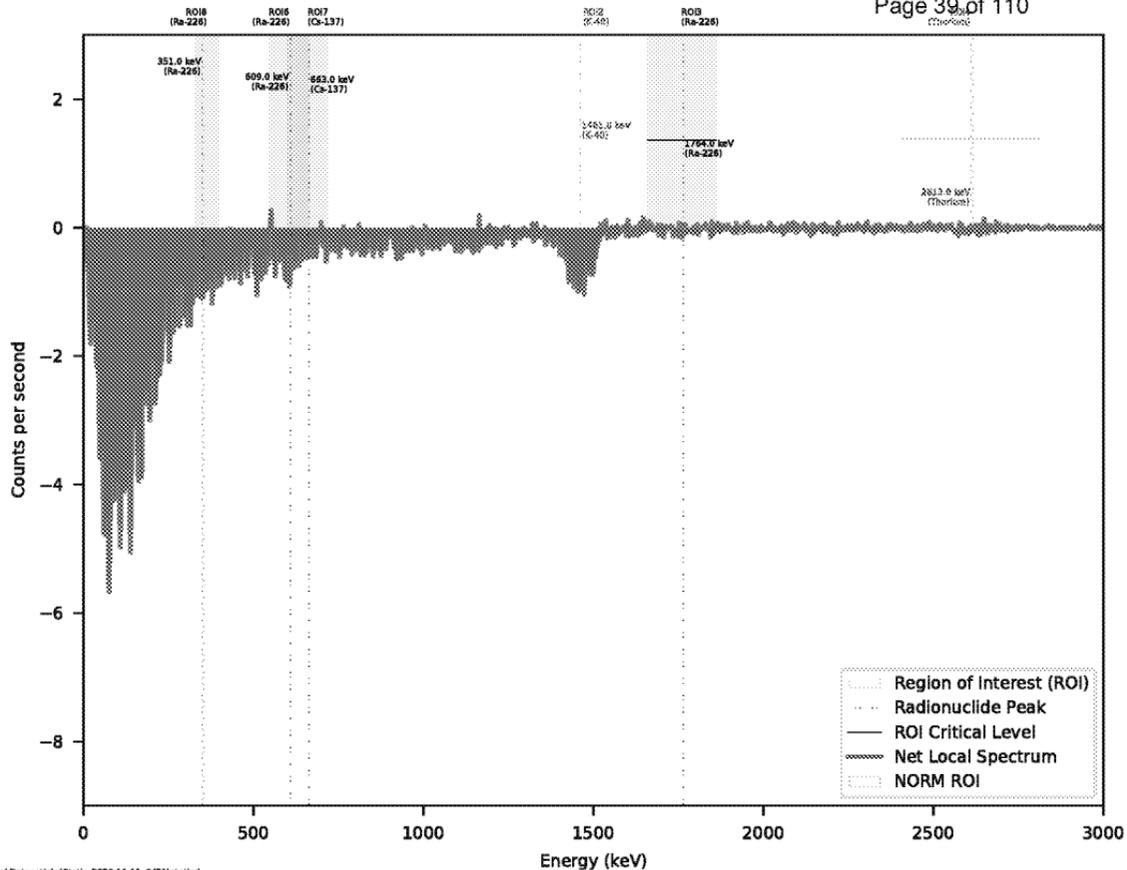


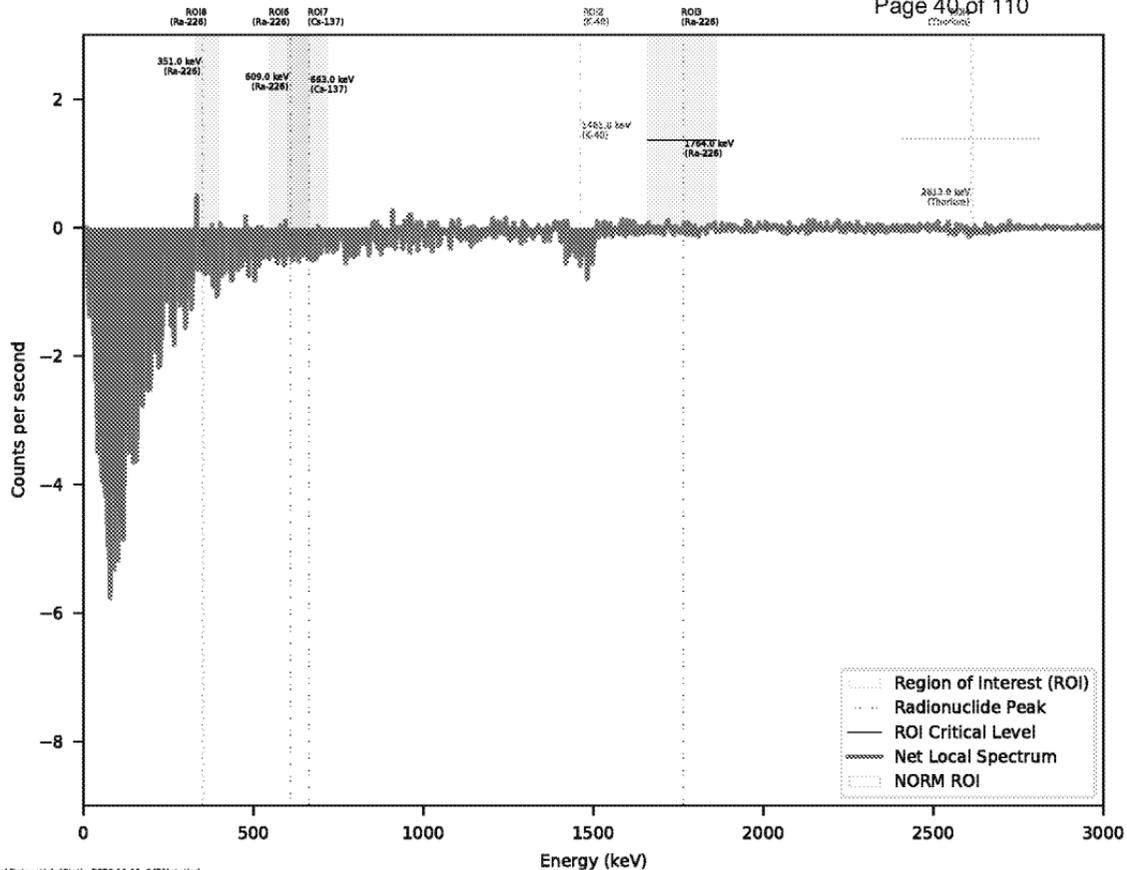


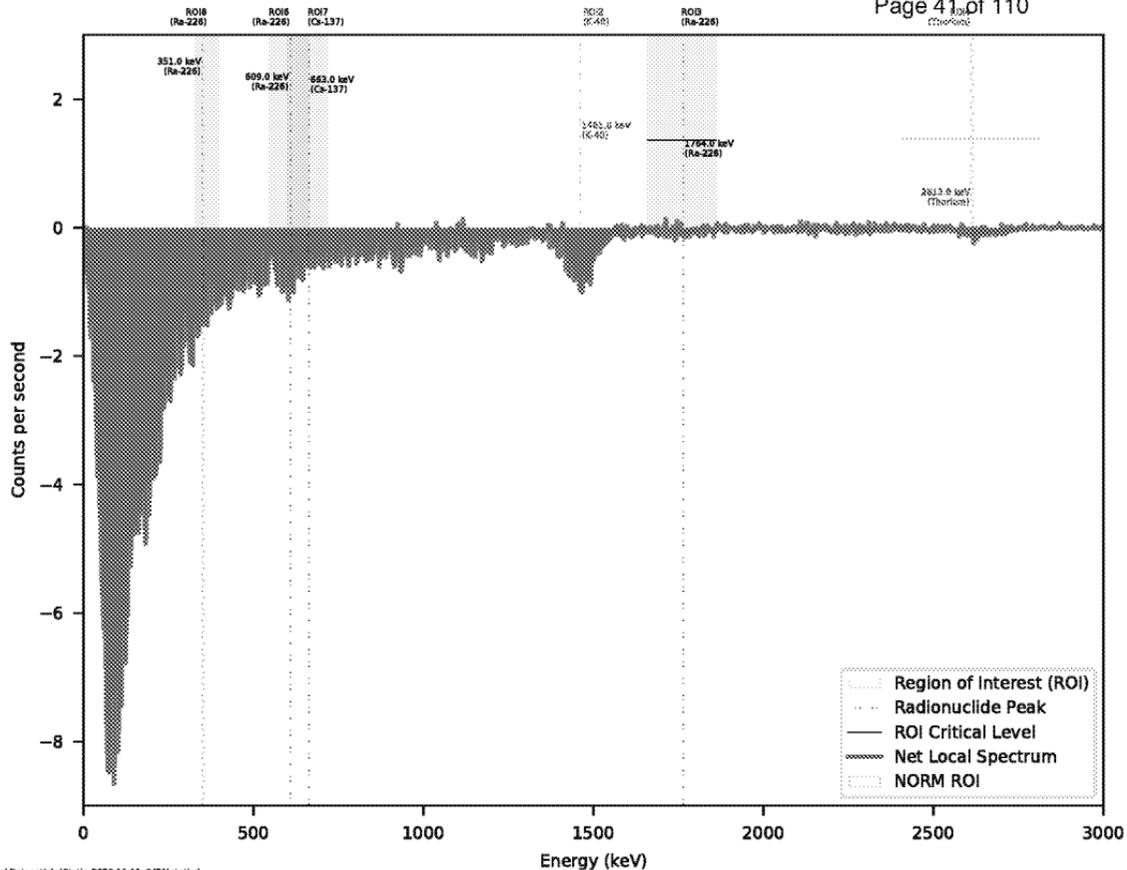


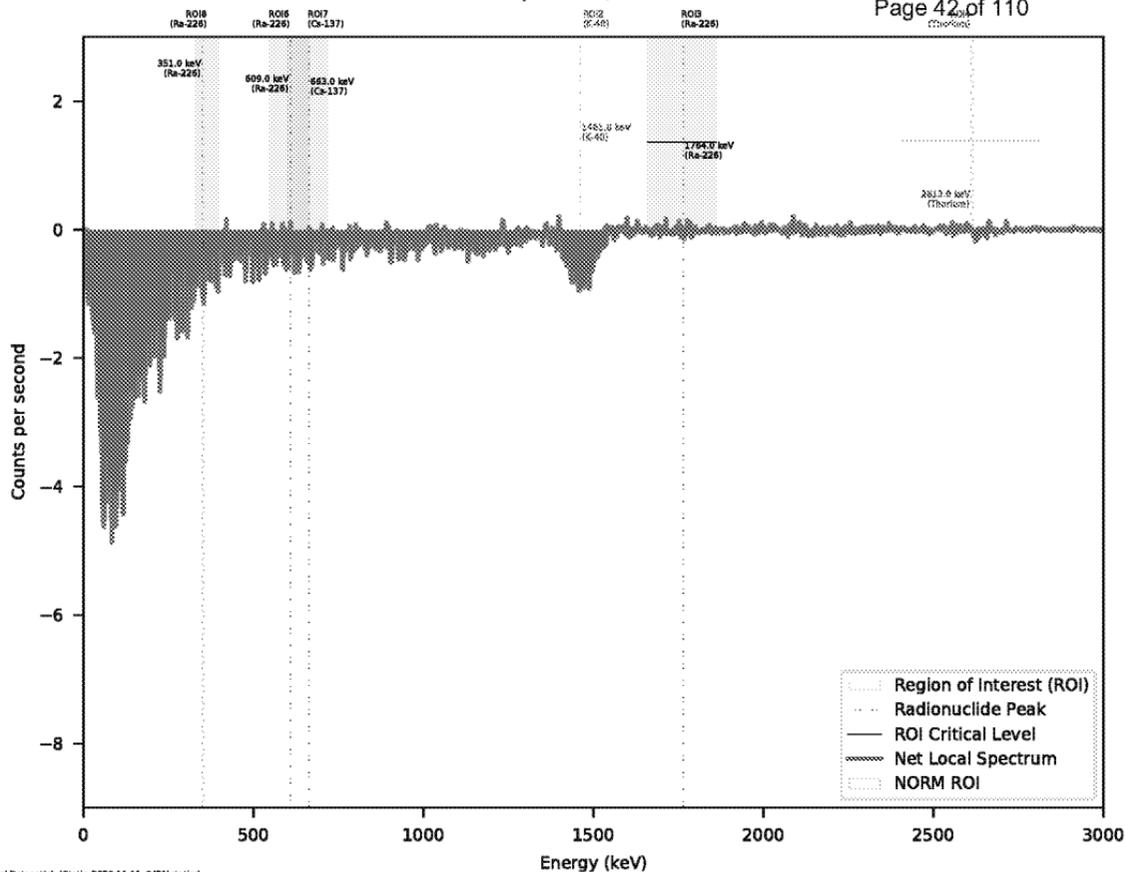


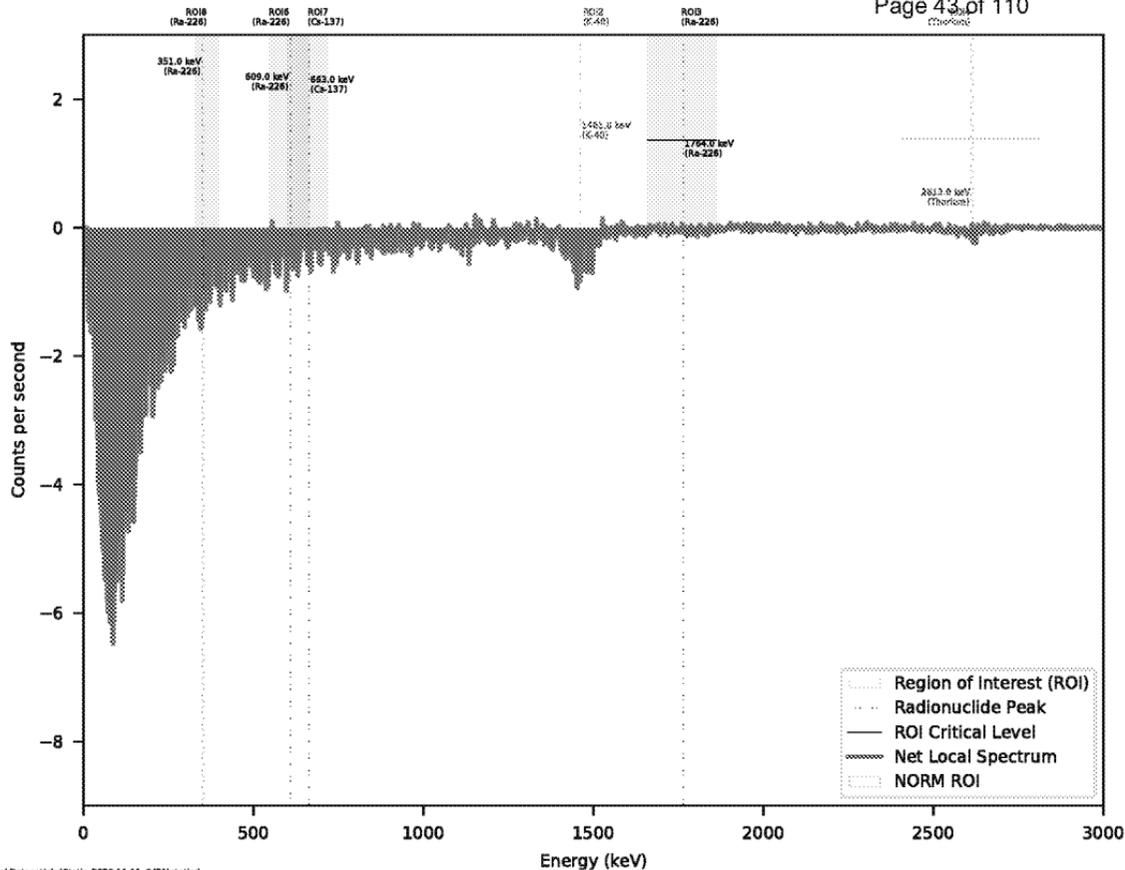


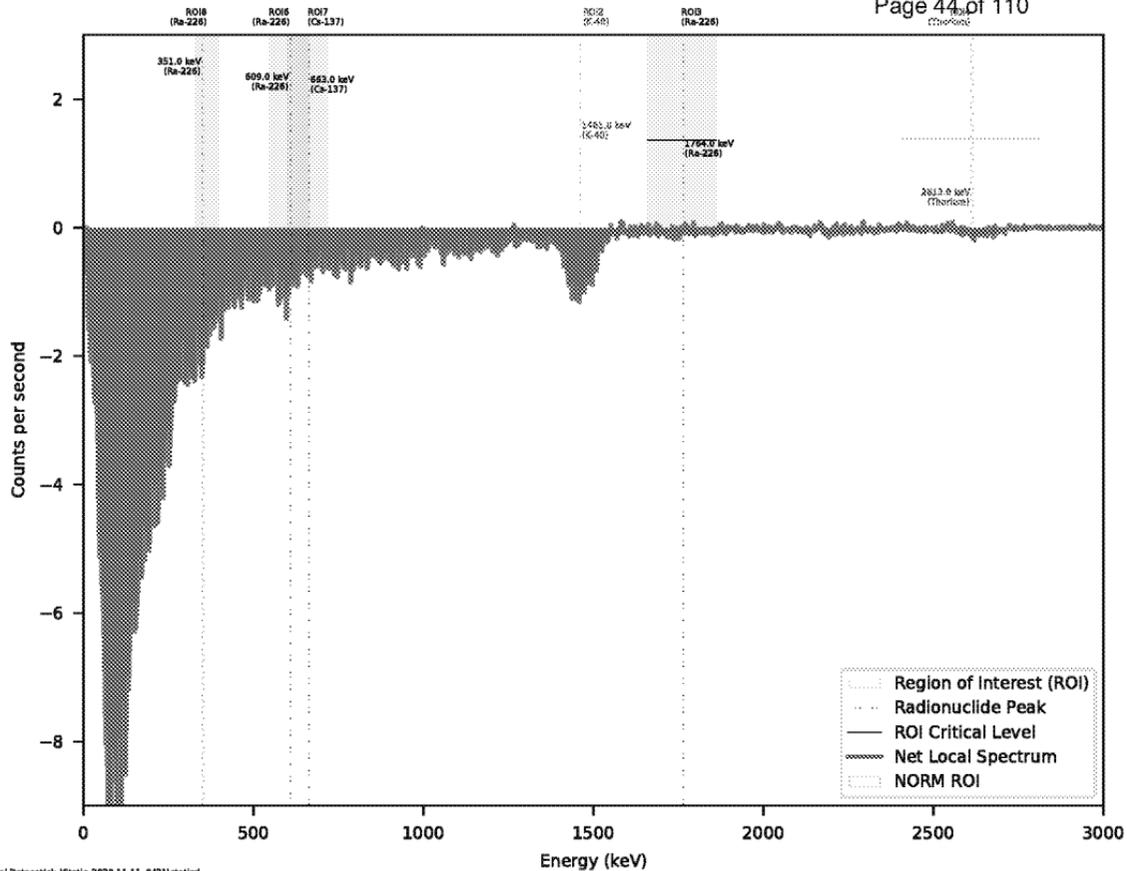


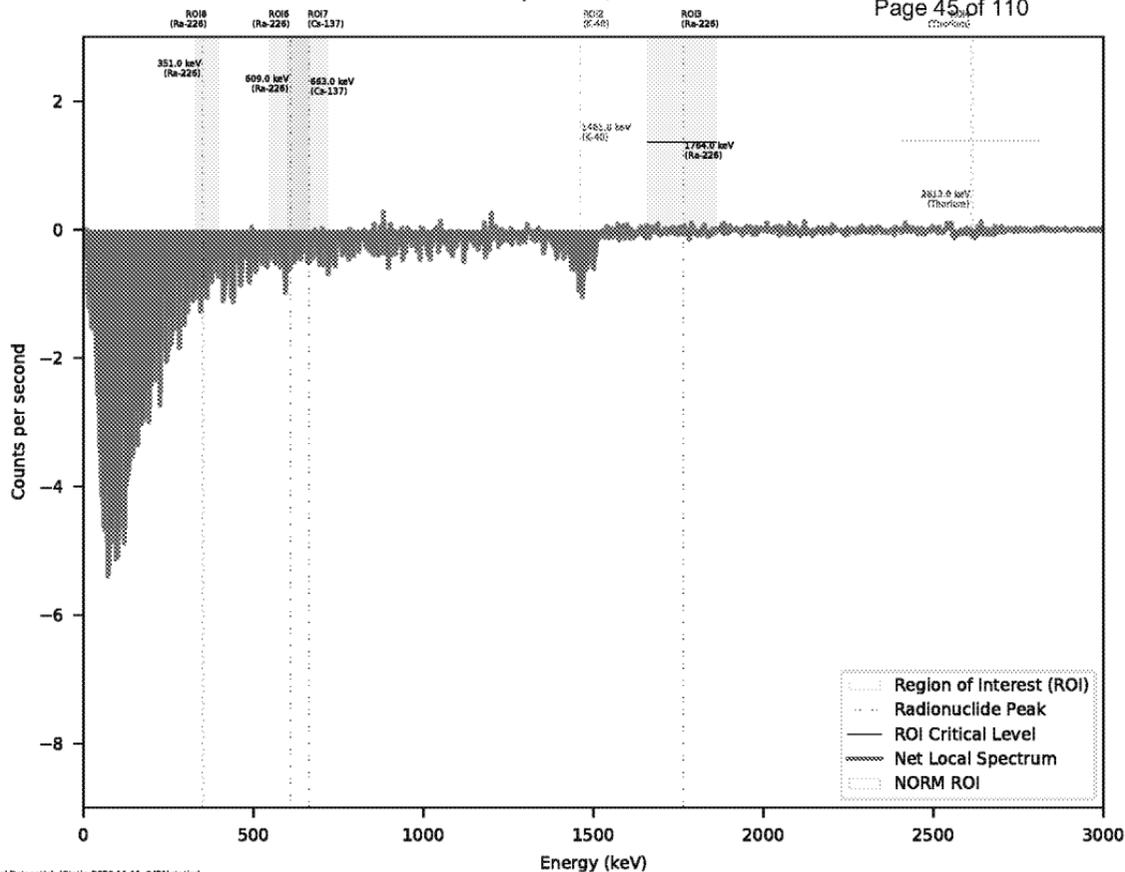


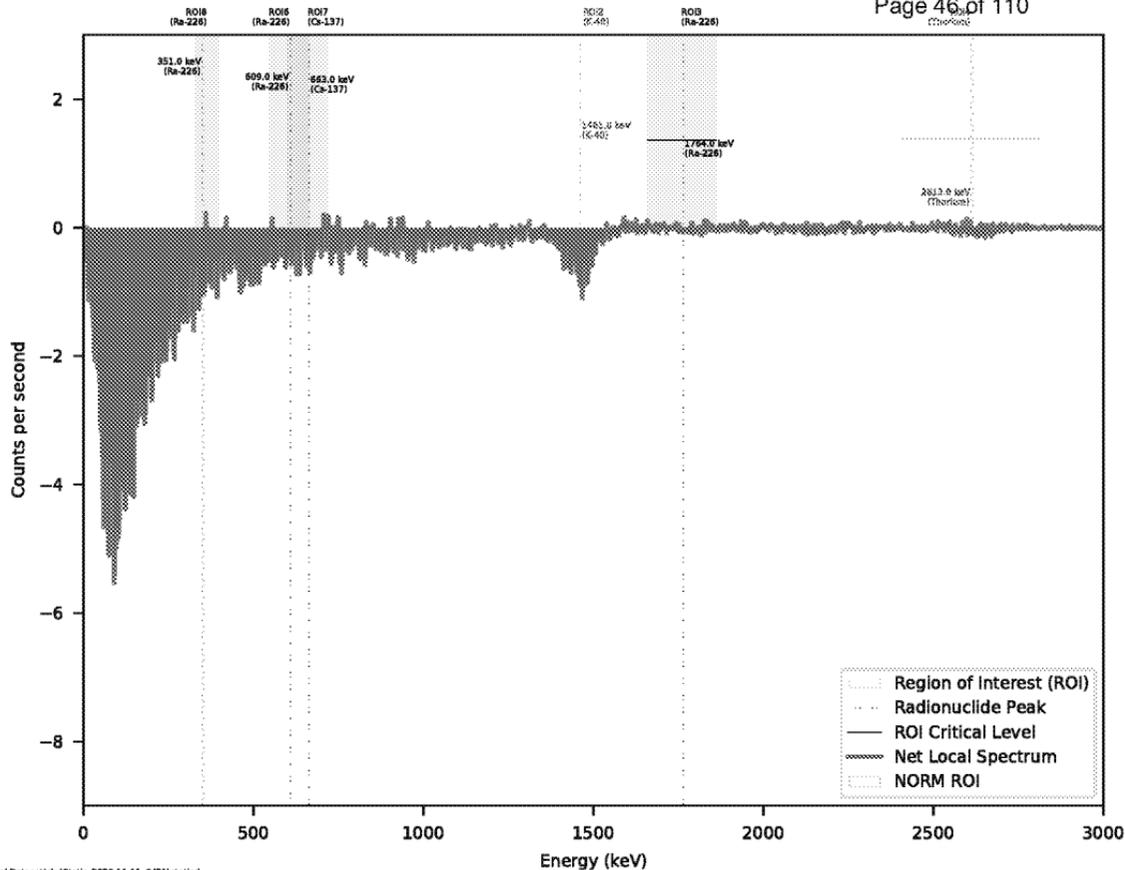


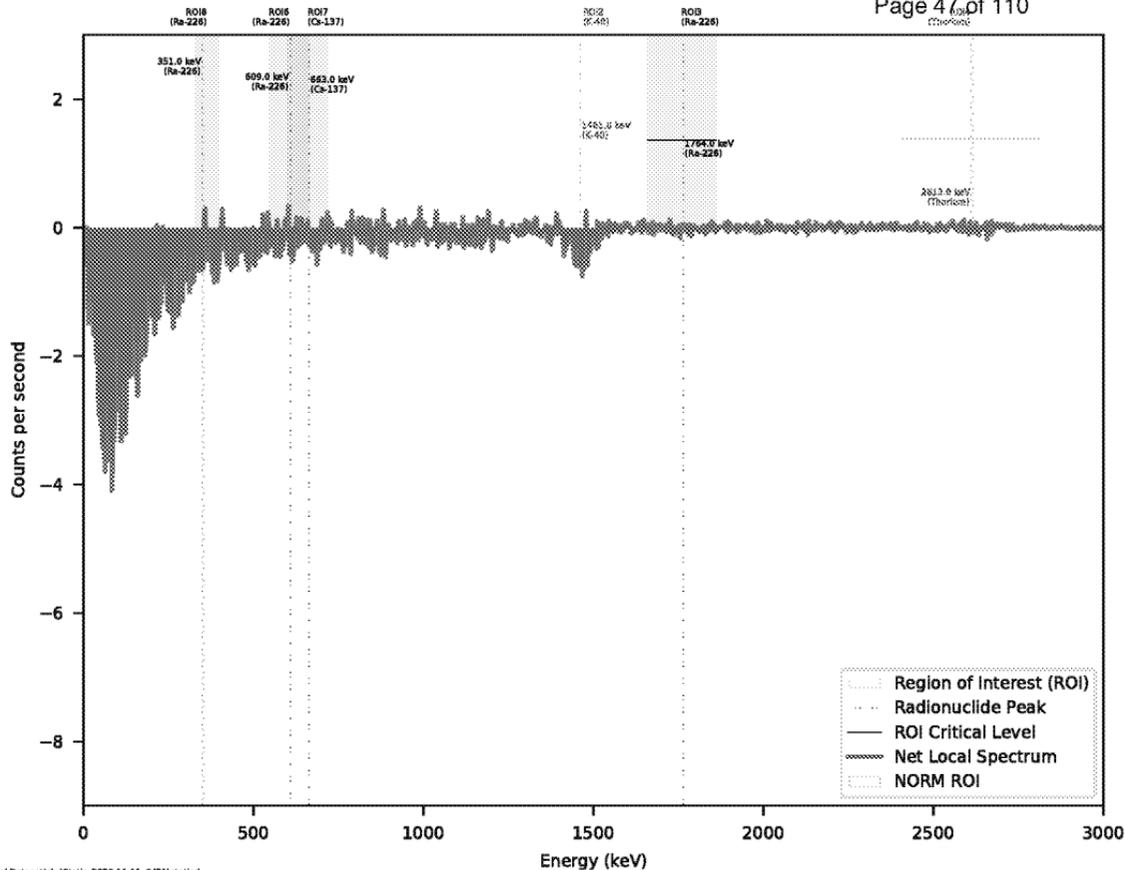


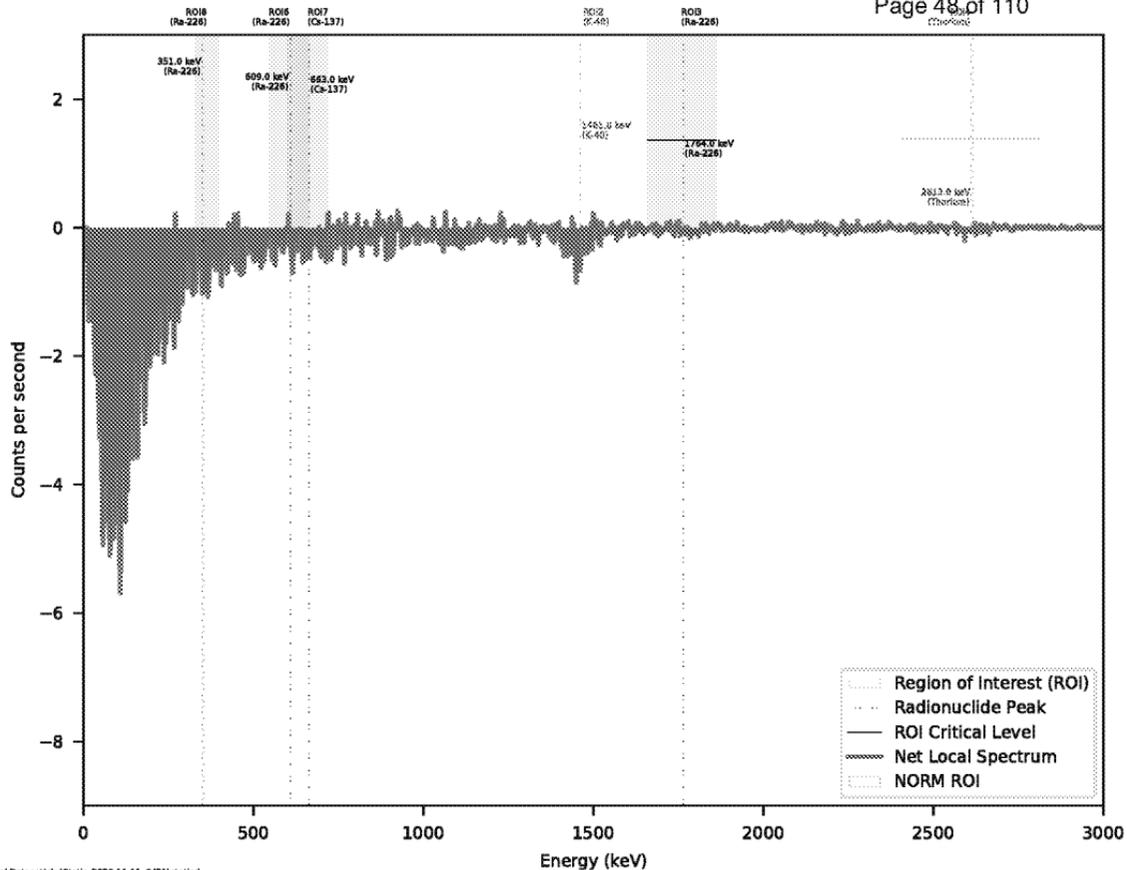


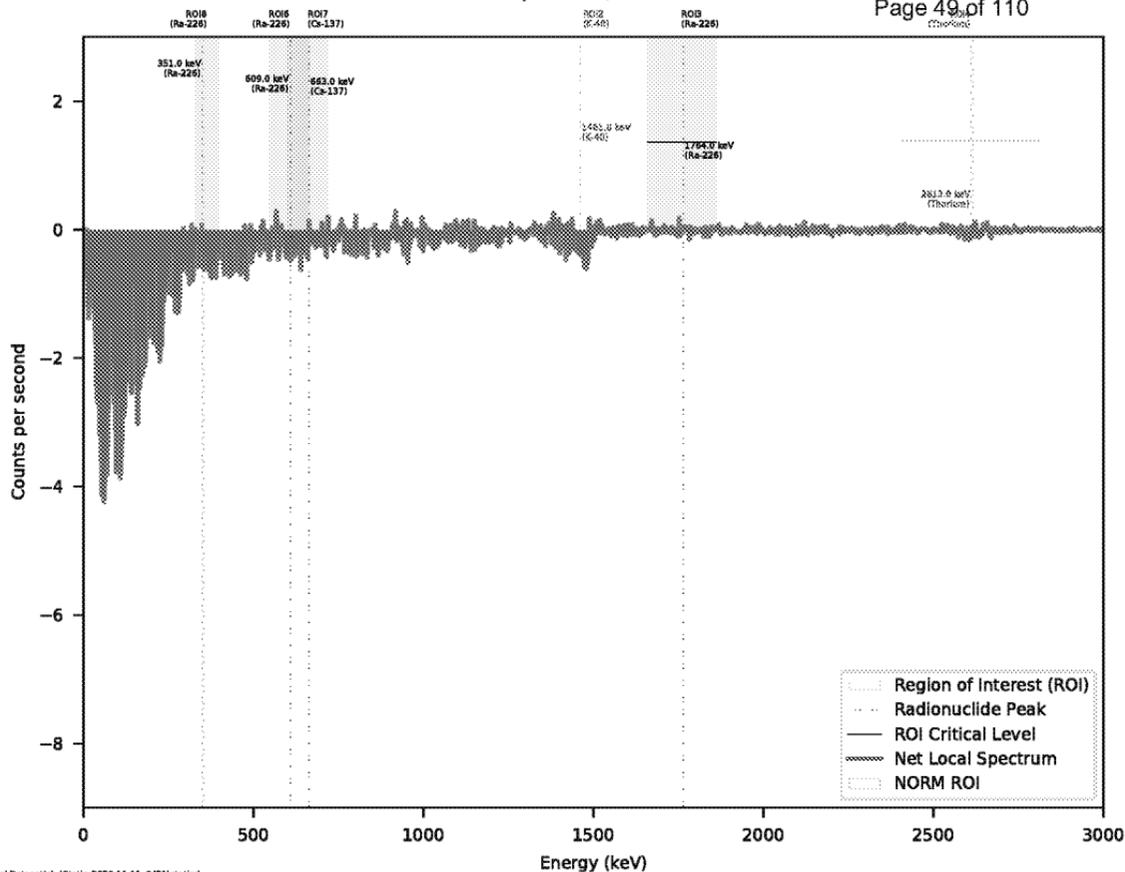


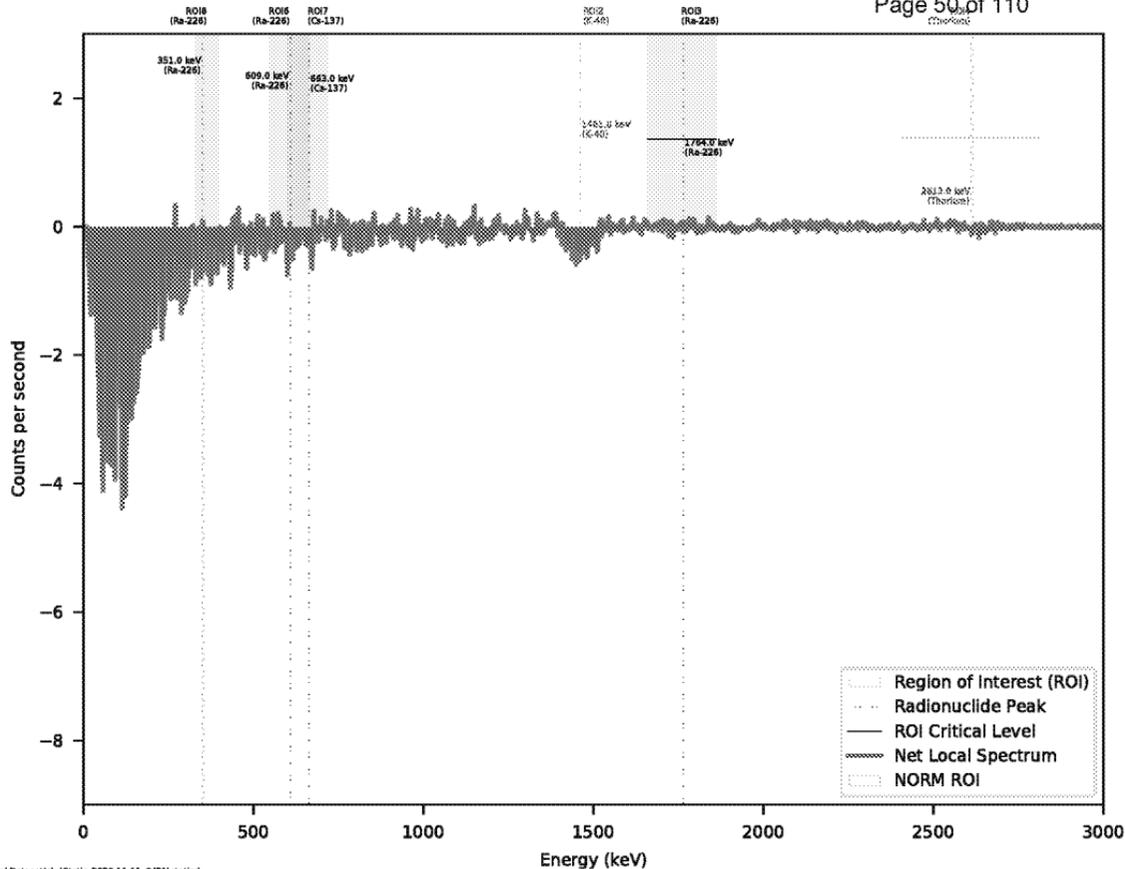


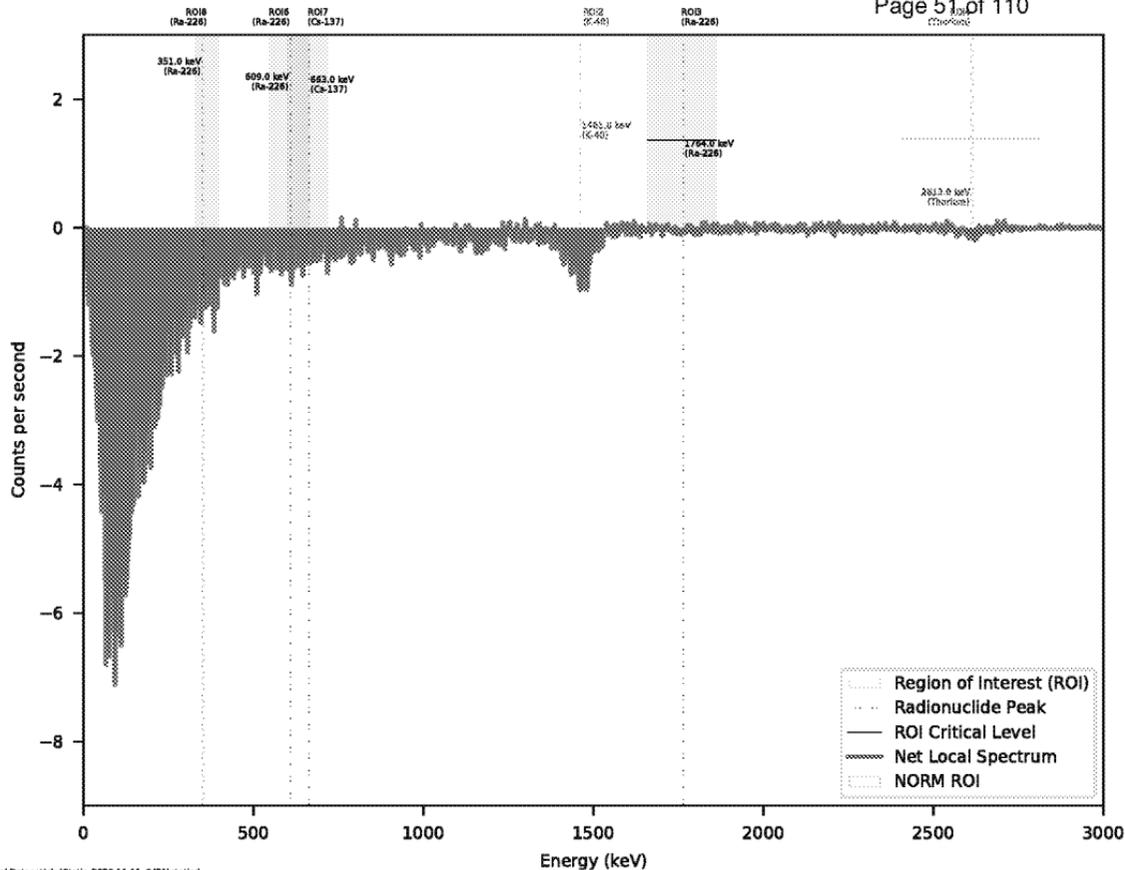


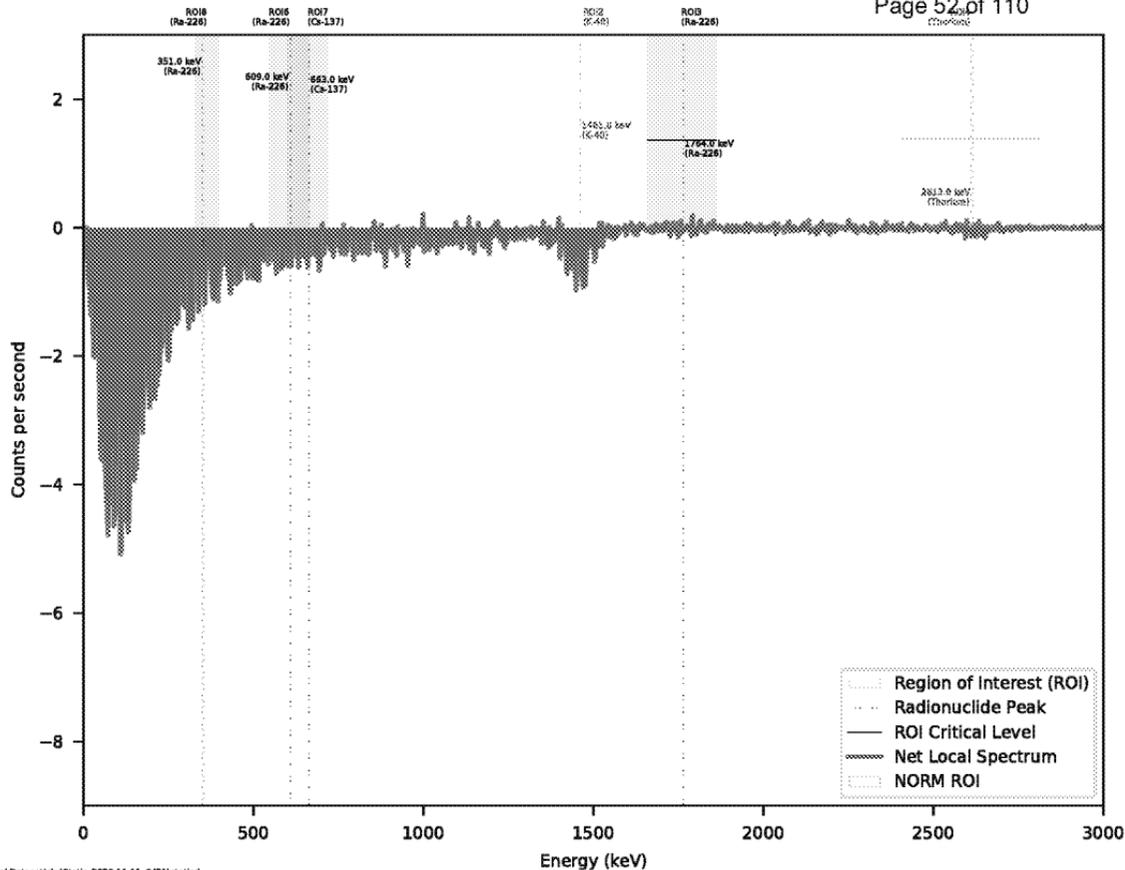


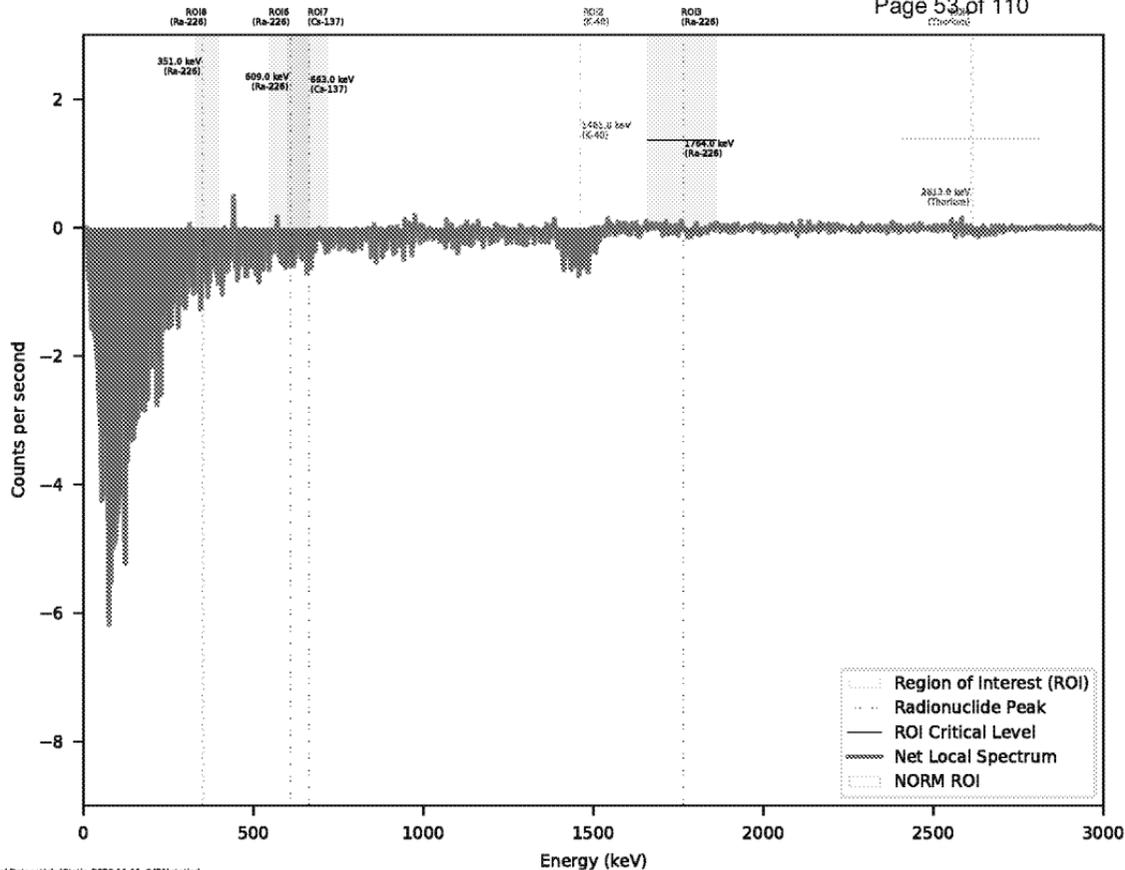


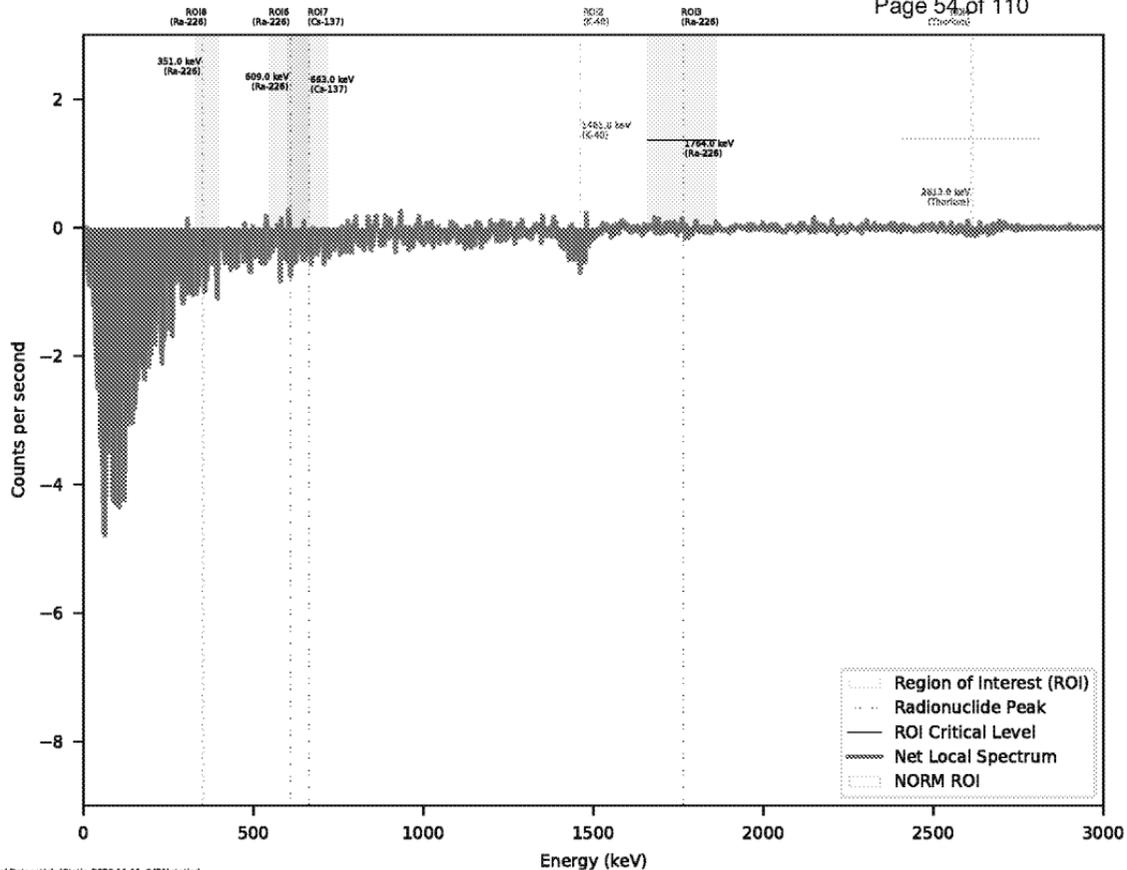


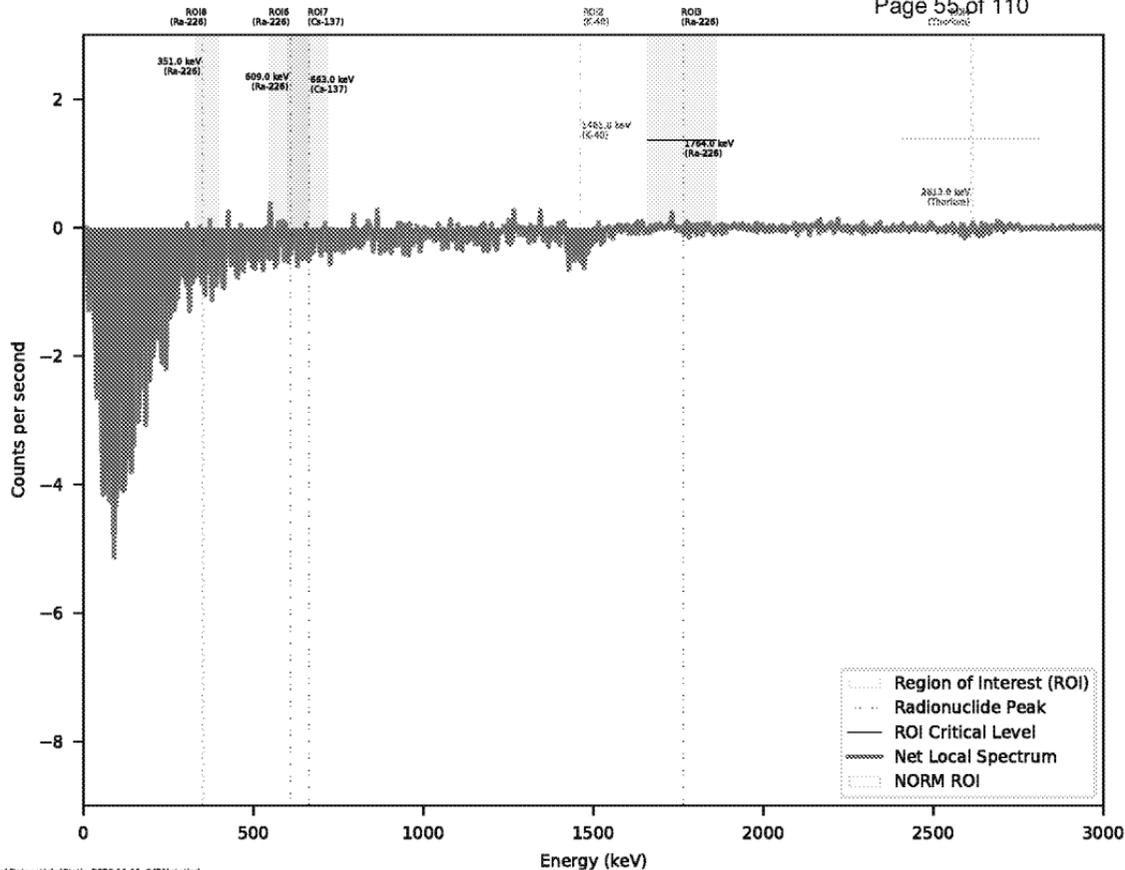


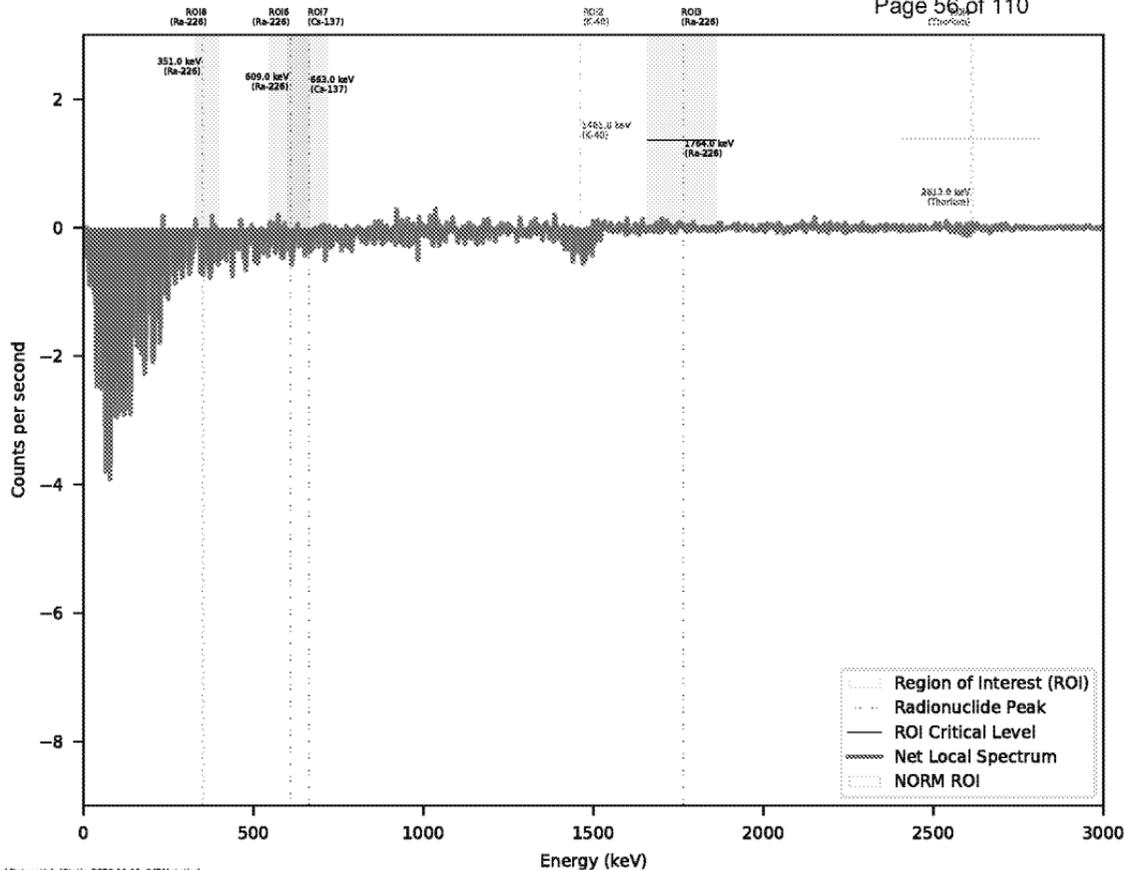












**ANALYTICAL REPORT**

Eurofins TestAmerica, St. Louis  
13715 Rider Trail North  
Earth City, MO 63045  
Tel: (314)298-8566

Laboratory Job ID: 160-40423-1  
Laboratory Sample Delivery Group: GJ46599771  
Client Project/Site: HPNS-Parcel G 501197  
Revision: 1

For:  
Aptim Federal Services LLC  
4005 Port Chicago Hwy, Suite 200  
Concord, California 94520

Attn: Rose Condit

*Rhonda Ridenhower*

---

Authorized for release by:  
4/9/2021 4:39:19 PM

Rhonda Ridenhower, Client Service Manager  
(314)298-8566  
Rhonda.Ridenhower@Eurofinset.com

## LINKS

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results through  
**Total Access**

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The  
Expert**

Visit us at:

[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

# Table of Contents

Cover Page . . . . .	1
Table of Contents . . . . .	2
Case Narrative . . . . .	3
Chain of Custody . . . . .	7
Receipt Checklists . . . . .	11
Definitions/Glossary . . . . .	12
Method Summary . . . . .	13
Sample Summary . . . . .	14
Client Sample Results . . . . .	15
QC Sample Results . . . . .	31
QC Association Summary . . . . .	37
Tracer Carrier Summary . . . . .	39



# Case Narrative

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
SDG: GJ46599771

Job ID: 160-40423-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

## CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40423-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Additional information requested in case narrative for total strontium

# Case Narrative

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
SDG: GJ46599771

## Job ID: 160-40423-1 (Continued)

### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

#### RECEIPT

The samples were received on 11/17/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 12.3 C.

#### STRONTIUM-90 (GFPC)

Samples HPPG-ESU-TU077A-001 (160-40423-1), HPPG-ESU-TU077A-011 (160-40423-11), HPPG-ESU-TU077A-021 (160-40423-21) and HPPG-F-033 (160-40423-26) were analyzed for Strontium-90 (GFPC) in accordance with EPA 905. The samples were dried on 11/18/2020, prepared on 12/16/2020 and 12/29/2020 and analyzed on 01/04/2021 and 01/07/2021.

Strontium-90 prep batch 492111

The method blank (MB) z-score is within limits and is stored in the level IV raw data. (MB 160-492111/22-A)

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-ESU-TU077A-021 (160-40423-21) and HPPG-F-033 (160-40423-26).

Strontium 90 prep batch 493370

The method blank (MB) z-score is within limits and is stored in the level IV raw data. (MB 160-493370/23-A)

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-ESU-TU077A-001 (160-40423-1) and HPPG-ESU-TU077A-011 (160-40423-11).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples HPPG-ESU-TU077A-001 (160-40423-1), HPPG-ESU-TU077A-002 (160-40423-2), HPPG-ESU-TU077A-003 (160-40423-3), HPPG-ESU-TU077A-004 (160-40423-4), HPPG-ESU-TU077A-005 (160-40423-5), HPPG-ESU-TU077A-006 (160-40423-6), HPPG-ESU-TU077A-007 (160-40423-7), HPPG-ESU-TU077A-008 (160-40423-8), HPPG-ESU-TU077A-009 (160-40423-9), HPPG-ESU-TU077A-010 (160-40423-10), HPPG-ESU-TU077A-011 (160-40423-11), HPPG-ESU-TU077A-012 (160-40423-12), HPPG-ESU-TU077A-013 (160-40423-13), HPPG-ESU-TU077A-014 (160-40423-14), HPPG-ESU-TU077A-015 (160-40423-15), HPPG-ESU-TU077A-016 (160-40423-16), HPPG-ESU-TU077A-017 (160-40423-17), HPPG-ESU-TU077A-018 (160-40423-18), HPPG-ESU-TU077A-019 (160-40423-19), HPPG-ESU-TU077A-020 (160-40423-20), HPPG-ESU-TU077A-021 (160-40423-21), HPPG-ESU-TU077A-022 (160-40423-22), HPPG-ESU-TU077A-023 (160-40423-23), HPPG-ESU-TU077A-024 (160-40423-24), HPPG-ESU-TU077A-025 (160-40423-25), HPPG-F-033 (160-40423-26) and HPPG-F-034 (160-40423-27) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA\_01\_R. The samples were leached on 11/18/2020, prepared on 11/20/2020 and analyzed on 12/13/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224

# Case Narrative

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
SDG: GJ46599771

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## Job ID: 160-40423-1 (Continued)

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### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

#### Gamma Prep batch 489912

The radium-226 detection goal of 0.200 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. The method blank activity is below the DLC and RL. (MB 160-489912/1-A)

The method blank (MB) z-score associated with Prep Batch 160-489912 is within limits and is stored in the level IV raw data. (MB 160-489912/1-A)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. HPPG-ESU-TU077A-022 (160-40423-22)

#### Gamma Prep batch 489913

The MB z-score for Tl-208 associated with Prep Batch 160-489913 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (MB 160-489913/1-A)

The replicate precision for Pb-212/Th-228 associated with Prep Batch 160-489458 and 160-489913 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (160-40426-A-16-C DU)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. HPPG-ESU-TU077A-024 (160-40423-24)

#### Gamma Prep batch 489914

The method blank (MB) z-score associated with Prep Batch 160-489914 is within limits and is stored in the level IV raw data. (MB 160-489914/1-A)

The radium-226 detection goal of 0.200 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. The method blank activity is below the DLC and RL. (MB 160-489914/1-A)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. HPPG-ESU-TU077A-002 (160-40423-2), HPPG-ESU-TU077A-005 (160-40423-5) and HPPG-ESU-TU077A-009 (160-40423-9)

The following sample exhibited a negative result greater in magnitude than the 3 sigma TPU: HPPG-ESU-TU077A-003 (160-40423-3). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

#### Gamma Prep batch 489915

# Case Narrative

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
SDG: GJ46599771

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## Job ID: 160-40423-1 (Continued)

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### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

The method blank (MB) z-score associated with Prep Batch 160-489915 is within limits and is stored in the level IV raw data. (MB 160-489915/1-A)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. The method blank activity is below the DLC and RL. (MB 160-489915/1-A)

The radium-226 detection goal of 0.200 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. The method blank activity is below the DLC and RL. (MB 160-489915/1-A)

The replicate precision for Th-234/U-238 associated with Prep Batch 160-489454 and 160-489915 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (160-40423-A-15-C DU)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. HPPG-ESU-TU077A-011 (160-40423-11)

The following samples exhibited a negative result greater in magnitude than the 3 sigma TPU for (160-40423-15;-Th-234 and LCS; Pa-234m: (LCS 160-489915/2-A) and (160-40423-A-15-C DU). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



# CHAIN OF CUSTODY

Ref. Document # 501197RSY-031

APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520

Project Manager: Lisa Bercik  
Phone #: (619)213-3389

Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy

Sample Lead: Murri, Andrew

Sample Tech(s): Paul Leblanc

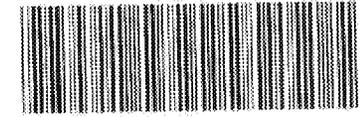
Project Number: 501197  
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action  
Project Location: San Francisco, CA  
Purchase Order #: 1159058  
Shipment/Pickup Date: 11/16/2020  
Waybill Number: 4957 0225 6078  
Lab Destination: Test America (St. Louis Lab)  
13715 Rider Trail North  
Earth City, MO 63046

Lab Contact Name/ph #: Rhoda Ridenbower (314)298-8566

### Analysis Requested

Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma

Strontium-90 (EPA 905 MOD)



160-40423 Chain of Custody

Dose Rate uR/Hr

Evidence Bag ID

Comment

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested							Dose Rate uR/Hr	Evidence Bag ID	Comment	
	Date	Time	Method				Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)									
HPPG-ESU-TU077A-001	11/11/2020	13:03	G	SO	1	16 oz. plastic jar	X		X						5	GJ46599771	
HPPG-ESU-TU077A-002	11/11/2020	13:06	G	SO	1	16 oz. plastic jar	X								5	GJ46599771	
HPPG-ESU-TU077A-003	11/11/2020	13:09	G	SO	1	16 oz. plastic jar	X								5	GJ46599771	
HPPG-ESU-TU077A-004	11/11/2020	13:11	G	SO	1	16 oz. plastic jar	X								5	GJ46599771	
HPPG-ESU-TU077A-005	11/11/2020	13:12	G	SO	1	16 oz. plastic jar	X								5	GJ46599771	
HPPG-ESU-TU077A-006	11/11/2020	13:13	G	SO	1	16 oz. plastic jar	X								5	GJ46599771	
HPPG-ESU-TU077A-007	11/11/2020	13:14	G	SO	1	16 oz. plastic jar	X								5	GJ46599771	
HPPG-ESU-TU077A-008	11/11/2020	13:16	G	SO	1	16 oz. plastic jar	X								5	GJ46599771	

**Special Instructions:** 21 day ingrowth results only

**Turnaround Time:** 3-day  10-Day  28-day  Other

**Level of QC Required:** I  II  III  Project Specific

**Method Codes:** C = Composite G = Grab **Matrix Codes:** DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Murri, Andrew		11/11/2020 17:07	Locked Storage (RKillpack)		11/11/2020 17:07
Locked Storage (RKillpack)		11/16/2020 14:22	Devin Lewis		11/16/2020 14:22
Devin Lewis		11/16/2020 14:26	SHIPPEDTOLAB		11/17/2020 0905

\*\*\* Last 3 transfers shown above - Complete list of transfers on last page \*\*\*

Page 7 of 39

4/9/2021 (Rev. 1)



# CHAIN OF CUSTODY

Ref. Document # 501197RSY-031

APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520

Project Manager: Lisa Bercik  
Phone #: (619)213-3389

Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0780  
Address: 4005 Port Chicago Hwy  
City: Concord, CA 94520

Sample Lead: Murri, Andrew

Sample Tech(s): Paul Leblanc

Project Number: 501197

Hunters Point Naval Shipyard; Parcel  
G Remedial Action

Project Name:

Project Location: San Francisco, CA

Purchase Order #: 1159058

Shipment/Pickup Date: 11/16/2020

Waybill Number: 4957 0225 6078

Lab Destination: Test America (St. Louis Lab)  
13715 Rider Trail North  
Earth City, MO 63046

Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested					Dose Rate uR/Hr	Evidence Bag ID	Comment	
	Date	Time	Method				Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)							
						Preservatives (water)									
						Preservatives (soil)									
HPPG-ESU-TU077A-009	11/11/2020	13:18	G	SO	1	16 oz. plastic jar	X					5	GJ46599771		
HPPG-ESU-TU077A-010	11/11/2020	13:20	G	SO	1	16 oz. plastic jar	X					5	GJ46599771		
HPPG-ESU-TU077A-011	11/11/2020	13:21	G	SO	1	16 oz. plastic jar	X		X			5	GJ46599771		
HPPG-ESU-TU077A-012	11/11/2020	13:23	G	SO	1	16 oz. plastic jar	X					5	GJ46599771		
HPPG-ESU-TU077A-013	11/11/2020	13:24	G	SO	1	16 oz. plastic jar	X					5	GJ46599771		
HPPG-ESU-TU077A-014	11/11/2020	13:26	G	SO	1	16 oz. plastic jar	X					5	GJ46599771		
HPPG-ESU-TU077A-015	11/11/2020	13:28	G	SO	1	16 oz. plastic jar	X					5	GJ46599771		
HPPG-ESU-TU077A-016	11/11/2020	13:29	G	SO	1	16 oz. plastic jar	X					5	GJ46599771		
HPPG-ESU-TU077A-017	11/11/2020	13:32	G	SO	1	16 oz. plastic jar	X					5	GJ46599771		
HPPG-ESU-TU077A-018	11/11/2020	13:34	G	SO	1	16 oz. plastic jar	X					5	GJ46599771		
HPPG-ESU-TU077A-019	11/11/2020	13:36	G	SO	1	16 oz. plastic jar	X					5	GJ46599771		
HPPG-ESU-TU077A-020	11/11/2020	13:37	G	SO	1	16 oz. plastic jar	X					5	GJ46599771		
HPPG-ESU-TU077A-021	11/11/2020	13:39	G	SO	1	16 oz. plastic jar	X		X			5	GJ46599771		
HPPG-ESU-TU077A-022	11/11/2020	13:41	G	SO	1	16 oz. plastic jar	X					5	GJ46599771		
HPPG-ESU-TU077A-023	11/11/2020	13:43	G	SO	1	16 oz. plastic jar	X					5	GJ46599771		
HPPG-ESU-TU077A-024	11/11/2020	13:46	G	SO	1	16 oz. plastic jar	X					5	GJ46599771		
HPPG-ESU-TU077A-025	11/11/2020	13:49	G	SO	1	16 oz. plastic jar	X					5	GJ46599771		





# CHAIN OF CUSTODY

Ref. Document # 501197RSY-031

APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520

Project Manager: Lisa Bercik  
Phone #: (619)213-3389

Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0720  
Address: 4005 Port Chicago Hwy  
City: Concord, CA 94520

Sample Lead: Murri, Andrew  
Sample Tech(s): Paul Leblanc

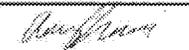
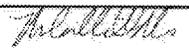
Project Number: 501197  
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action  
Project Location: San Francisco, CA  
Purchase Order #: 1159058  
Shipment/Pickup Date: 11/16/2020  
Waybill Number: 4957 0225 6078  
Lab Destination: Test America (St. Louis Lab)  
13715 Rider Trail North  
Earth City, MO 63046

Lab Contact Name/ph #: Rhoeda Riderbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested					Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method				Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)						
HPPG-F-033	11/11/2020	13:03	G	SO	1	16 oz. plastic jar	X	X				5	GJ46599771	
HPPG-F-034	11/11/2020	13:32	G	SO	1	16 oz. plastic jar	X					5	GJ46599771	



# All Transfers for COC 501197RSY-031

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Murri, Andrew		11/11/2020 17:07	Locked Storage (RKillpack)		11/11/2020 17:07
Locked Storage (RKillpack)		11/16/2020 14:22	Devin Lewis		11/16/2020 14:22
Devin Lewis		11/16/2020 14:26	SHIPPEDTOLAB		11/17/2020 09:05

# Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40423-1

SDG Number: GJ46599771

**Login Number: 40423**  
**List Number: 1**  
**Creator: Greer, Diane A**

**List Source: Eurofins TestAmerica, St. Louis**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

# Definitions/Glossary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
SDG: GJ46599771

## Qualifiers

### Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

# Method Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
SDG: GJ46599771

Method	Method Description	Protocol	Laboratory
905	Strontium-90 (GFPC)	EPA	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-7	Preparation, Digestion/Precipitate Separation (7-Day In-Growth)	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

**Protocol References:**

DOE = U.S. Department of Energy  
EPA = US Environmental Protection Agency  
None = None

**Laboratory References:**

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

# Sample Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
SDG: GJ46599771

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40423-1	HPPG-ESU-TU077A-001	Solid	11/11/20 13:03	11/17/20 09:05	
160-40423-2	HPPG-ESU-TU077A-002	Solid	11/11/20 13:06	11/17/20 09:05	
160-40423-3	HPPG-ESU-TU077A-003	Solid	11/11/20 13:09	11/17/20 09:05	
160-40423-4	HPPG-ESU-TU077A-004	Solid	11/11/20 13:11	11/17/20 09:05	
160-40423-5	HPPG-ESU-TU077A-005	Solid	11/11/20 13:12	11/17/20 09:05	
160-40423-6	HPPG-ESU-TU077A-006	Solid	11/11/20 13:13	11/17/20 09:05	
160-40423-7	HPPG-ESU-TU077A-007	Solid	11/11/20 13:14	11/17/20 09:05	
160-40423-8	HPPG-ESU-TU077A-008	Solid	11/11/20 13:16	11/17/20 09:05	
160-40423-9	HPPG-ESU-TU077A-009	Solid	11/11/20 13:18	11/17/20 09:05	
160-40423-10	HPPG-ESU-TU077A-010	Solid	11/11/20 13:20	11/17/20 09:05	
160-40423-11	HPPG-ESU-TU077A-011	Solid	11/11/20 13:21	11/17/20 09:05	
160-40423-12	HPPG-ESU-TU077A-012	Solid	11/11/20 13:23	11/17/20 09:05	
160-40423-13	HPPG-ESU-TU077A-013	Solid	11/11/20 13:24	11/17/20 09:05	
160-40423-14	HPPG-ESU-TU077A-014	Solid	11/11/20 13:26	11/17/20 09:05	
160-40423-15	HPPG-ESU-TU077A-015	Solid	11/11/20 13:28	11/17/20 09:05	
160-40423-16	HPPG-ESU-TU077A-016	Solid	11/11/20 13:29	11/17/20 09:05	
160-40423-17	HPPG-ESU-TU077A-017	Solid	11/11/20 13:32	11/17/20 09:05	
160-40423-18	HPPG-ESU-TU077A-018	Solid	11/11/20 13:34	11/17/20 09:05	
160-40423-19	HPPG-ESU-TU077A-019	Solid	11/11/20 13:36	11/17/20 09:05	
160-40423-20	HPPG-ESU-TU077A-020	Solid	11/11/20 13:37	11/17/20 09:05	
160-40423-21	HPPG-ESU-TU077A-021	Solid	11/11/20 13:39	11/17/20 09:05	
160-40423-22	HPPG-ESU-TU077A-022	Solid	11/11/20 13:41	11/17/20 09:05	
160-40423-23	HPPG-ESU-TU077A-023	Solid	11/11/20 13:43	11/17/20 09:05	
160-40423-24	HPPG-ESU-TU077A-024	Solid	11/11/20 13:46	11/17/20 09:05	
160-40423-25	HPPG-ESU-TU077A-025	Solid	11/11/20 13:49	11/17/20 09:05	
160-40423-26	HPPG-F-033	Solid	11/11/20 13:03	11/17/20 09:05	
160-40423-27	HPPG-F-034	Solid	11/11/20 13:32	11/17/20 09:05	

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
 SDG: GJ46599771

**Client Sample ID: HPPG-ESU-TU077A-001**

**Lab Sample ID: 160-40423-1**

Date Collected: 11/11/20 13:03

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: 905 - Strontium-90 (GFPC)**

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Strontium-90	-0.129	U	0.129	0.129	0.331	0.117	pCi/g	12/29/20 21:17	01/07/21 16:10	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	101		40 - 110					12/29/20 21:17	01/07/21 16:10	1
Y Carrier	86.7		40 - 110					12/29/20 21:17	01/07/21 16:10	1

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.450		0.115	0.124		0.0179	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Actinium-227	-0.251	U	0.505	0.506		0.293	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Bismuth-212	0.843		0.289	0.302		0.0577	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Bismuth-214	0.358		0.0939	0.101		0.0373	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Cesium-137	-0.0129	U	0.0461	0.0461	0.0700	0.0370	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Lead-210	0.518	U	0.942	0.944		0.749	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Lead-212	0.406		0.0687	0.0864		0.0325	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Lead-214	0.464		0.0797	0.0931		0.0412	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Potassium-40	9.23		1.06	1.42		0.0705	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Protactinium-231	0.482	U	1.36	1.36		1.48	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Protactinium-234	0.120	U	0.141	0.142		0.153	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Radium-226	0.358		0.0939	0.101	0.200	0.0373	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Radium-228	0.450		0.115	0.124		0.0179	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Thallium-208	0.161		0.0465	0.0494		0.0167	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Thorium 228	0.406		0.0687	0.0864		0.0325	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Thorium-232	0.450		0.115	0.124		0.0179	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Thorium-234	0.340		0.266	0.269		0.232	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Uranium-235	-0.0117	U	0.0193	0.0193		0.328	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Uranium-238	0.340		0.266	0.269		0.232	pCi/g	11/20/20 21:15	12/13/20 19:17	1

**Client Sample ID: HPPG-ESU-TU077A-002**

**Lab Sample ID: 160-40423-2**

Date Collected: 11/11/20 13:06

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.865		0.203	0.221		0.0408	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Actinium-227	-0.508	U	0.924	0.926		0.533	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Bismuth-212	-0.0546	U	1.15	1.15		0.943	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Bismuth-214	0.539		0.144	0.155		0.0514	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Cesium-137	0.0365	U	0.0902	0.0903	0.0700	0.0713	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Lead-210	-0.0392	U	1.75	1.75		1.44	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Lead-212	0.621		0.177	0.195		0.0788	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Lead-214	0.424		0.168	0.173		0.109	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Potassium-40	10.3		1.75	2.04		0.303	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Protactinium-231	0.600	U	1.86	1.86		2.04	pCi/g	11/20/20 21:15	12/13/20 19:19	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
 SDG: GJ46599771

**Client Sample ID: HPPG-ESU-TU077A-002**

**Lab Sample ID: 160-40423-2**

Date Collected: 11/11/20 13:06

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.0206	U	0.0329	0.0329		0.302	pCi/g	11/20/20 21:15	12/13/20 19:19	1
<b>Radium-226</b>	<b>0.539</b>		0.144	0.155	0.200	0.0514	pCi/g	11/20/20 21:15	12/13/20 19:19	1
<b>Radium-228</b>	<b>0.865</b>		0.203	0.221		0.0408	pCi/g	11/20/20 21:15	12/13/20 19:19	1
<b>Thallium-208</b>	<b>0.289</b>		0.0733	0.0792		0.0189	pCi/g	11/20/20 21:15	12/13/20 19:19	1
<b>Thorium 228</b>	<b>0.621</b>		0.177	0.195		0.0788	pCi/g	11/20/20 21:15	12/13/20 19:19	1
<b>Thorium-232</b>	<b>0.865</b>		0.203	0.221		0.0408	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Thorium-234	-0.887	U	0.806	0.812		1.43	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Uranium-235	-0.263	U	0.428	0.429		0.523	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Uranium-238	-0.887	U	0.806	0.812		1.43	pCi/g	11/20/20 21:15	12/13/20 19:19	1

**Client Sample ID: HPPG-ESU-TU077A-003**

**Lab Sample ID: 160-40423-3**

Date Collected: 11/11/20 13:09

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.543</b>		0.202	0.209		0.112	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Actinium-227	-0.0635	U	0.592	0.592		0.366	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Bismuth-212	0.325	U	0.676	0.677		0.523	pCi/g	11/20/20 21:15	12/13/20 19:20	1
<b>Bismuth-214</b>	<b>0.397</b>		0.139	0.145		0.0644	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Cesium-137	0.0200	U	0.0644	0.0645	0.0700	0.0513	pCi/g	11/20/20 21:15	12/13/20 19:20	1
<b>Lead-210</b>	<b>1.44</b>		1.29	1.30		0.849	pCi/g	11/20/20 21:15	12/13/20 19:20	1
<b>Lead-212</b>	<b>0.374</b>		0.0858	0.0985		0.0404	pCi/g	11/20/20 21:15	12/13/20 19:20	1
<b>Lead-214</b>	<b>0.486</b>		0.122	0.132		0.0620	pCi/g	11/20/20 21:15	12/13/20 19:20	1
<b>Potassium-40</b>	<b>7.18</b>		1.25	1.45		0.277	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Protactinium-231	-0.915	U	3.13	3.13		2.55	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Protactinium-234	0.145	U	0.195	0.195		0.228	pCi/g	11/20/20 21:15	12/13/20 19:20	1
<b>Radium-226</b>	<b>0.397</b>		0.139	0.145	0.200	0.0644	pCi/g	11/20/20 21:15	12/13/20 19:20	1
<b>Radium-228</b>	<b>0.543</b>		0.202	0.209		0.112	pCi/g	11/20/20 21:15	12/13/20 19:20	1
<b>Thallium-208</b>	<b>0.0913</b>		0.0797	0.0802		0.0376	pCi/g	11/20/20 21:15	12/13/20 19:20	1
<b>Thorium 228</b>	<b>0.374</b>		0.0858	0.0985		0.0404	pCi/g	11/20/20 21:15	12/13/20 19:20	1
<b>Thorium-232</b>	<b>0.543</b>		0.202	0.209		0.112	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Thorium-234	-1.04	U	0.661	0.672		0.859	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Uranium-235	0.208	U	0.307	0.308		0.253	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Uranium-238	-1.04	U	0.661	0.672		0.859	pCi/g	11/20/20 21:15	12/13/20 19:20	1

**Client Sample ID: HPPG-ESU-TU077A-004**

**Lab Sample ID: 160-40423-4**

Date Collected: 11/11/20 13:11

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.352</b>		0.154	0.159		0.189	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Actinium-227	-0.0137	U	0.829	0.829		0.441	pCi/g	11/20/20 21:15	12/13/20 19:19	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
 SDG: GJ46599771

**Client Sample ID: HPPG-ESU-TU077A-004**

**Lab Sample ID: 160-40423-4**

Date Collected: 11/11/20 13:11

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-212	1.54		0.602	0.628		0.138	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Bismuth-214	0.637		0.196	0.210		0.0756	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Cesium-137	-0.0252	U	0.0960	0.0961	0.0700	0.0770	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Lead-210	0.665	U	1.84	1.84		1.27	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Lead-212	0.442		0.127	0.137		0.0747	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Lead-214	0.556		0.161	0.173		0.0859	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Potassium-40	10.7		1.80	2.18		0.374	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Protactinium-231	0.393	U	1.88	1.88		2.92	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Protactinium-234	0.0157	U	0.0294	0.0294		0.338	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Radium-226	0.637		0.196	0.210	0.200	0.0756	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Radium-228	0.352		0.154	0.159		0.189	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Thallium-208	0.304		0.0968	0.103		0.0362	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Thorium 228	0.442		0.127	0.137		0.0747	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Thorium-232	0.352		0.154	0.159		0.189	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Thorium-234	-0.184	U	1.24	1.24		1.02	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Uranium-235	-0.122	U	0.275	0.275		0.723	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Uranium-238	-0.184	U	1.24	1.24		1.02	pCi/g	11/20/20 21:15	12/13/20 19:19	1

**Client Sample ID: HPPG-ESU-TU077A-005**

**Lab Sample ID: 160-40423-5**

Date Collected: 11/11/20 13:12

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.405		0.340	0.342		0.161	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Actinium-227	0.0314	U	0.0482	0.0483		0.409	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Bismuth-212	0.410	U	0.729	0.731		0.544	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Bismuth-214	0.510		0.155	0.163		0.0570	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Cesium-137	-0.0242	U	0.116	0.116	0.0700	0.0943	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Lead-210	-2.09	U	2.08	2.09		2.05	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Lead-212	0.500		0.0987	0.112		0.0390	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Lead-214	0.561		0.132	0.144		0.0481	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Potassium-40	6.49		1.44	1.58		0.261	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Protactinium-231	0.000	U	0.898	0.898		2.63	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Protactinium-234	0.0367	U	0.0561	0.0563		0.262	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Radium-226	0.510		0.155	0.163	0.200	0.0570	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Radium-228	0.405		0.340	0.342		0.161	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Thallium-208	0.251		0.0773	0.0814		0.0196	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Thorium 228	0.500		0.0987	0.112		0.0390	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Thorium-232	0.405		0.340	0.342		0.161	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Thorium-234	0.870		0.718	0.724		0.488	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Uranium-235	0.125	U	0.314	0.315		0.299	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Uranium-238	0.870		0.718	0.724		0.488	pCi/g	11/20/20 21:15	12/13/20 19:22	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
 SDG: GJ46599771

**Client Sample ID: HPPG-ESU-TU077A-006**

**Lab Sample ID: 160-40423-6**

Date Collected: 11/11/20 13:13

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.273</b>		0.131	0.134		0.128	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Actinium-227	-0.316	U	0.569	0.570		0.421	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Bismuth-212	-0.318	U	0.688	0.689		0.697	pCi/g	11/20/20 21:15	12/13/20 19:24	1
<b>Bismuth-214</b>	<b>0.373</b>		0.127	0.132		0.0431	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Cesium-137	-0.00184	U	0.0642	0.0642	0.0700	0.0527	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Lead-210	0.392	U	1.55	1.55		1.25	pCi/g	11/20/20 21:15	12/13/20 19:24	1
<b>Lead-212</b>	<b>0.330</b>		0.0872	0.0970		0.0442	pCi/g	11/20/20 21:15	12/13/20 19:24	1
<b>Lead-214</b>	<b>0.421</b>		0.108	0.116		0.0517	pCi/g	11/20/20 21:15	12/13/20 19:24	1
<b>Potassium-40</b>	<b>7.12</b>		1.31	1.50		0.347	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Protactinium-231	-0.873	U	2.97	2.97		2.42	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Protactinium-234	0.0526	U	0.114	0.114		0.171	pCi/g	11/20/20 21:15	12/13/20 19:24	1
<b>Radium-226</b>	<b>0.373</b>		0.127	0.132	0.200	0.0431	pCi/g	11/20/20 21:15	12/13/20 19:24	1
<b>Radium-228</b>	<b>0.273</b>		0.131	0.134		0.128	pCi/g	11/20/20 21:15	12/13/20 19:24	1
<b>Thallium-208</b>	<b>0.153</b>		0.0504	0.0529		0.0170	pCi/g	11/20/20 21:15	12/13/20 19:24	1
<b>Thorium 228</b>	<b>0.330</b>		0.0872	0.0970		0.0442	pCi/g	11/20/20 21:15	12/13/20 19:24	1
<b>Thorium-232</b>	<b>0.273</b>		0.131	0.134		0.128	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Thorium-234	-0.795	U	0.940	0.944		0.828	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Uranium-235	0.254	U	0.249	0.251		0.264	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Uranium-238	-0.795	U	0.940	0.944		0.828	pCi/g	11/20/20 21:15	12/13/20 19:24	1

**Client Sample ID: HPPG-ESU-TU077A-007**

**Lab Sample ID: 160-40423-7**

Date Collected: 11/11/20 13:14

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.155</b>		0.194	0.195		0.113	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Actinium-227	-0.310	U	0.302	0.305		0.366	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Bismuth-212	-0.0327	U	0.575	0.575		0.456	pCi/g	11/20/20 21:15	12/13/20 20:26	1
<b>Bismuth-214</b>	<b>0.338</b>		0.0962	0.102		0.0390	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Cesium-137	0.000	U	0.0164	0.0164	0.0700	0.0492	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Lead-210	0.601	U	1.33	1.34		1.07	pCi/g	11/20/20 21:15	12/13/20 20:26	1
<b>Lead-212</b>	<b>0.468</b>		0.0778	0.0986		0.0242	pCi/g	11/20/20 21:15	12/13/20 20:26	1
<b>Lead-214</b>	<b>0.260</b>		0.0894	0.0934		0.0492	pCi/g	11/20/20 21:15	12/13/20 20:26	1
<b>Potassium-40</b>	<b>7.79</b>		1.21	1.45		0.284	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Protactinium-231	0.554	U	1.52	1.53		1.67	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Protactinium-234	0.0899	U	0.0901	0.0906		0.220	pCi/g	11/20/20 21:15	12/13/20 20:26	1
<b>Radium-226</b>	<b>0.338</b>		0.0962	0.102	0.200	0.0390	pCi/g	11/20/20 21:15	12/13/20 20:26	1
<b>Radium-228</b>	<b>0.155</b>		0.194	0.195		0.113	pCi/g	11/20/20 21:15	12/13/20 20:26	1
<b>Thallium-208</b>	<b>0.166</b>		0.0448	0.0480		0.0121	pCi/g	11/20/20 21:15	12/13/20 20:26	1
<b>Thorium 228</b>	<b>0.468</b>		0.0778	0.0986		0.0242	pCi/g	11/20/20 21:15	12/13/20 20:26	1
<b>Thorium-232</b>	<b>0.155</b>		0.194	0.195		0.113	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Thorium-234	0.0000000	U	0.984	0.984		0.811	pCi/g	11/20/20 21:15	12/13/20 20:26	1
	296									
Uranium-235	0.000	U	0.0826	0.0826		0.413	pCi/g	11/20/20 21:15	12/13/20 20:26	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
 SDG: GJ46599771

**Client Sample ID: HPPG-ESU-TU077A-007**

**Lab Sample ID: 160-40423-7**

Date Collected: 11/11/20 13:14

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Uranium-238	0.0000000	U	0.984	0.984		0.811	pCi/g	11/20/20 21:15	12/13/20 20:26	1
	296									

**Client Sample ID: HPPG-ESU-TU077A-008**

**Lab Sample ID: 160-40423-8**

Date Collected: 11/11/20 13:16

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.639</b>		0.213	0.223		0.172	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Actinium-227	0.167	U	0.527	0.528		0.319	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Bismuth-212	0.367	U	0.612	0.613		0.454	pCi/g	11/20/20 21:15	12/13/20 20:26	1
<b>Bismuth-214</b>	<b>0.505</b>		0.163	0.171		0.0692	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Cesium-137	-0.00532	U	0.0668	0.0668	0.0700	0.0545	pCi/g	11/20/20 21:15	12/13/20 20:26	1
<b>Lead-210</b>	<b>1.68</b>		1.54	1.56		1.00	pCi/g	11/20/20 21:15	12/13/20 20:26	1
<b>Lead-212</b>	<b>0.529</b>		0.106	0.120		0.0480	pCi/g	11/20/20 21:15	12/13/20 20:26	1
<b>Lead-214</b>	<b>0.490</b>		0.148	0.156		0.0746	pCi/g	11/20/20 21:15	12/13/20 20:26	1
<b>Potassium-40</b>	<b>9.97</b>		1.51	1.82		0.134	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Protactinium-231	0.000	U	0.807	0.807		2.46	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Protactinium-234	0.0984	U	0.338	0.338		0.275	pCi/g	11/20/20 21:15	12/13/20 20:26	1
<b>Radium-226</b>	<b>0.505</b>		0.163	0.171	0.200	0.0692	pCi/g	11/20/20 21:15	12/13/20 20:26	1
<b>Radium-228</b>	<b>0.639</b>		0.213	0.223		0.172	pCi/g	11/20/20 21:15	12/13/20 20:26	1
<b>Thallium-208</b>	<b>0.181</b>		0.0564	0.0593		0.0140	pCi/g	11/20/20 21:15	12/13/20 20:26	1
<b>Thorium 228</b>	<b>0.529</b>		0.106	0.120		0.0480	pCi/g	11/20/20 21:15	12/13/20 20:26	1
<b>Thorium-232</b>	<b>0.639</b>		0.213	0.223		0.172	pCi/g	11/20/20 21:15	12/13/20 20:26	1
<b>Thorium-234</b>	<b>0.907</b>		0.638	0.646		0.468	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Uranium-235	0.0180	U	0.226	0.226		0.473	pCi/g	11/20/20 21:15	12/13/20 20:26	1
<b>Uranium-238</b>	<b>0.907</b>		0.638	0.646		0.468	pCi/g	11/20/20 21:15	12/13/20 20:26	1

**Client Sample ID: HPPG-ESU-TU077A-009**

**Lab Sample ID: 160-40423-9**

Date Collected: 11/11/20 13:18

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.787</b>		0.252	0.265		0.0470	pCi/g	11/20/20 21:15	12/13/20 19:23	1
Actinium-227	-0.402	U	0.860	0.861		0.518	pCi/g	11/20/20 21:15	12/13/20 19:23	1
Bismuth-212	0.443	U	0.894	0.896		0.681	pCi/g	11/20/20 21:15	12/13/20 19:23	1
<b>Bismuth-214</b>	<b>0.329</b>		0.166	0.170		0.0916	pCi/g	11/20/20 21:15	12/13/20 19:23	1
Cesium-137	-0.0116	U	0.0896	0.0896	0.0700	0.0747	pCi/g	11/20/20 21:15	12/13/20 19:23	1
<b>Lead-210</b>	<b>1.04</b>		1.34	1.35		0.886	pCi/g	11/20/20 21:15	12/13/20 19:23	1
<b>Lead-212</b>	<b>0.511</b>		0.110	0.129		0.0457	pCi/g	11/20/20 21:15	12/13/20 19:23	1
<b>Lead-214</b>	<b>0.416</b>		0.138	0.145		0.0941	pCi/g	11/20/20 21:15	12/13/20 19:23	1
<b>Potassium-40</b>	<b>9.73</b>		1.83	2.08		0.321	pCi/g	11/20/20 21:15	12/13/20 19:23	1
Protactinium-231	0.704	U	2.14	2.15		2.36	pCi/g	11/20/20 21:15	12/13/20 19:23	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
 SDG: GJ46599771

**Client Sample ID: HPPG-ESU-TU077A-009**

**Lab Sample ID: 160-40423-9**

Date Collected: 11/11/20 13:18

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Protactinium-234	-0.0977	U	0.253	0.253		0.203	pCi/g	11/20/20 21:15	12/13/20 19:23	1
<b>Radium-226</b>	<b>0.329</b>		0.166	0.170	0.200	0.0916	pCi/g	11/20/20 21:15	12/13/20 19:23	1
<b>Radium-228</b>	<b>0.787</b>		0.252	0.265		0.0470	pCi/g	11/20/20 21:15	12/13/20 19:23	1
<b>Thallium-208</b>	<b>0.157</b>		0.0683	0.0702		0.0262	pCi/g	11/20/20 21:15	12/13/20 19:23	1
<b>Thorium 228</b>	<b>0.511</b>		0.110	0.129		0.0457	pCi/g	11/20/20 21:15	12/13/20 19:23	1
<b>Thorium-232</b>	<b>0.787</b>		0.252	0.265		0.0470	pCi/g	11/20/20 21:15	12/13/20 19:23	1
<b>Thorium-234</b>	<b>0.507</b>		0.567	0.570		0.457	pCi/g	11/20/20 21:15	12/13/20 19:23	1
Uranium-235	0.212	U	0.394	0.394		0.277	pCi/g	11/20/20 21:15	12/13/20 19:23	1
<b>Uranium-238</b>	<b>0.507</b>		0.567	0.570		0.457	pCi/g	11/20/20 21:15	12/13/20 19:23	1

**Client Sample ID: HPPG-ESU-TU077A-010**

**Lab Sample ID: 160-40423-10**

Date Collected: 11/11/20 13:20

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.439</b>		0.228	0.233		0.0967	pCi/g	11/20/20 22:00	12/13/20 10:56	1
Actinium-227	-0.123	U	0.622	0.622		0.366	pCi/g	11/20/20 22:00	12/13/20 10:56	1
Bismuth-212	0.304	U	0.547	0.548		0.417	pCi/g	11/20/20 22:00	12/13/20 10:56	1
<b>Bismuth-214</b>	<b>0.381</b>		0.107	0.114		0.0449	pCi/g	11/20/20 22:00	12/13/20 10:56	1
Cesium-137	0.0164	U	0.0599	0.0599	0.0700	0.0480	pCi/g	11/20/20 22:00	12/13/20 10:56	1
Lead-210	0.588	U	1.21	1.21		0.963	pCi/g	11/20/20 22:00	12/13/20 10:56	1
<b>Lead-212</b>	<b>0.523</b>		0.0869	0.110		0.0354	pCi/g	11/20/20 22:00	12/13/20 10:56	1
<b>Lead-214</b>	<b>0.489</b>		0.102	0.114		0.0466	pCi/g	11/20/20 22:00	12/13/20 10:56	1
<b>Potassium-40</b>	<b>8.67</b>		1.21	1.50		0.0985	pCi/g	11/20/20 22:00	12/13/20 10:56	1
Protactinium-231	0.101	U	1.19	1.19		1.97	pCi/g	11/20/20 22:00	12/13/20 10:56	1
Protactinium-234	0.141	U	0.235	0.235		0.200	pCi/g	11/20/20 22:00	12/13/20 10:56	1
<b>Radium-226</b>	<b>0.381</b>		0.107	0.114	0.200	0.0449	pCi/g	11/20/20 22:00	12/13/20 10:56	1
<b>Radium-228</b>	<b>0.439</b>		0.228	0.233		0.0967	pCi/g	11/20/20 22:00	12/13/20 10:56	1
<b>Thallium-208</b>	<b>0.161</b>		0.0546	0.0571		0.0198	pCi/g	11/20/20 22:00	12/13/20 10:56	1
<b>Thorium 228</b>	<b>0.523</b>		0.0869	0.110		0.0354	pCi/g	11/20/20 22:00	12/13/20 10:56	1
<b>Thorium-232</b>	<b>0.439</b>		0.228	0.233		0.0967	pCi/g	11/20/20 22:00	12/13/20 10:56	1
<b>Thorium-234</b>	<b>0.876</b>		0.490	0.500		0.275	pCi/g	11/20/20 22:00	12/13/20 10:56	1
Uranium-235	-0.103	U	0.277	0.277		0.456	pCi/g	11/20/20 22:00	12/13/20 10:56	1
<b>Uranium-238</b>	<b>0.876</b>		0.490	0.500		0.275	pCi/g	11/20/20 22:00	12/13/20 10:56	1

**Client Sample ID: HPPG-ESU-TU077A-011**

**Lab Sample ID: 160-40423-11**

Date Collected: 11/11/20 13:21

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: 905 - Strontium-90 (GFPC)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Strontium-90</b>	<b>0.154</b>		0.150	0.150	0.331	0.110	pCi/g	12/29/20 21:17	01/07/21 16:10	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
 SDG: GJ46599771

**Client Sample ID: HPPG-ESU-TU077A-011**

**Lab Sample ID: 160-40423-11**

Date Collected: 11/11/20 13:21

Matrix: Solid

Date Received: 11/17/20 09:05

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	95.2		40 - 110	12/29/20 21:17	01/07/21 16:10	1
Y Carrier	88.2		40 - 110	12/29/20 21:17	01/07/21 16:10	1

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
<b>Actinium 228</b>	<b>0.630</b>		0.174	0.185		0.0703	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Actinium-227	-0.401	U	0.787	0.789		0.475	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Bismuth-212	0.0894	U	0.993	0.993		0.810	pCi/g	11/20/20 22:00	12/13/20 11:37	1
<b>Bismuth-214</b>	<b>0.456</b>		0.140	0.148		0.0523	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Cesium-137	-0.0198	U	0.0972	0.0972	0.0700	0.0785	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Lead-210	0.612	U	1.31	1.31		1.02	pCi/g	11/20/20 22:00	12/13/20 11:37	1
<b>Lead-212</b>	<b>0.633</b>		0.110	0.128		0.0445	pCi/g	11/20/20 22:00	12/13/20 11:37	1
<b>Lead-214</b>	<b>0.499</b>		0.117	0.127		0.0498	pCi/g	11/20/20 22:00	12/13/20 11:37	1
<b>Potassium-40</b>	<b>10.7</b>		1.97	2.25		0.471	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Protactinium-231	0.000	U	0.713	0.713		2.34	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Protactinium-234	0.0445	U	0.0813	0.0814		0.296	pCi/g	11/20/20 22:00	12/13/20 11:37	1
<b>Radium-226</b>	<b>0.456</b>		0.140	0.148	0.200	0.0523	pCi/g	11/20/20 22:00	12/13/20 11:37	1
<b>Radium-228</b>	<b>0.630</b>		0.174	0.185		0.0703	pCi/g	11/20/20 22:00	12/13/20 11:37	1
<b>Thallium-208</b>	<b>0.288</b>		0.0971	0.101		0.0345	pCi/g	11/20/20 22:00	12/13/20 11:37	1
<b>Thorium 228</b>	<b>0.633</b>		0.110	0.128		0.0445	pCi/g	11/20/20 22:00	12/13/20 11:37	1
<b>Thorium-232</b>	<b>0.630</b>		0.174	0.185		0.0703	pCi/g	11/20/20 22:00	12/13/20 11:37	1
<b>Thorium-234</b>	<b>0.863</b>		0.603	0.611		0.513	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Uranium-235	-0.208	U	0.189	0.190		0.554	pCi/g	11/20/20 22:00	12/13/20 11:37	1
<b>Uranium-238</b>	<b>0.863</b>		0.603	0.611		0.513	pCi/g	11/20/20 22:00	12/13/20 11:37	1

**Client Sample ID: HPPG-ESU-TU077A-012**

**Lab Sample ID: 160-40423-12**

Date Collected: 11/11/20 13:23

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
<b>Actinium 228</b>	<b>0.305</b>		0.235	0.237		0.113	pCi/g	11/20/20 22:00	12/13/20 11:01	1
Actinium-227	-0.344	U	0.635	0.637		0.415	pCi/g	11/20/20 22:00	12/13/20 11:01	1
Bismuth-212	-0.0185	U	0.543	0.543		0.655	pCi/g	11/20/20 22:00	12/13/20 11:01	1
<b>Bismuth-214</b>	<b>0.481</b>		0.124	0.134		0.0359	pCi/g	11/20/20 22:00	12/13/20 11:01	1
Cesium-137	-0.0442	U	0.0793	0.0794	0.0700	0.0622	pCi/g	11/20/20 22:00	12/13/20 11:01	1
<b>Lead-210</b>	<b>1.08</b>		1.51	1.52		0.971	pCi/g	11/20/20 22:00	12/13/20 11:01	1
<b>Lead-212</b>	<b>0.495</b>		0.0975	0.117		0.0471	pCi/g	11/20/20 22:00	12/13/20 11:01	1
<b>Lead-214</b>	<b>0.500</b>		0.101	0.114		0.0575	pCi/g	11/20/20 22:00	12/13/20 11:01	1
<b>Potassium-40</b>	<b>8.95</b>		1.36	1.64		0.308	pCi/g	11/20/20 22:00	12/13/20 11:01	1
Protactinium-231	0.489	U	2.03	2.04		2.19	pCi/g	11/20/20 22:00	12/13/20 11:01	1
Protactinium-234	-0.00853	U	0.0187	0.0188		0.189	pCi/g	11/20/20 22:00	12/13/20 11:01	1
<b>Radium-226</b>	<b>0.481</b>		0.124	0.134	0.200	0.0359	pCi/g	11/20/20 22:00	12/13/20 11:01	1
<b>Radium-228</b>	<b>0.305</b>		0.235	0.237		0.113	pCi/g	11/20/20 22:00	12/13/20 11:01	1
<b>Thallium-208</b>	<b>0.146</b>		0.0518	0.0540		0.0214	pCi/g	11/20/20 22:00	12/13/20 11:01	1
<b>Thorium 228</b>	<b>0.495</b>		0.0975	0.117		0.0471	pCi/g	11/20/20 22:00	12/13/20 11:01	1
<b>Thorium-232</b>	<b>0.305</b>		0.235	0.237		0.113	pCi/g	11/20/20 22:00	12/13/20 11:01	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
 SDG: GJ46599771

**Client Sample ID: HPPG-ESU-TU077A-012**

**Lab Sample ID: 160-40423-12**

Date Collected: 11/11/20 13:23

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Thorium-234	-0.0320	U	0.994	0.994		0.819	pCi/g	11/20/20 22:00	12/13/20 11:01	1
Uranium-235	0.000	U	0.167	0.167		0.309	pCi/g	11/20/20 22:00	12/13/20 11:01	1
Uranium-238	-0.0320	U	0.994	0.994		0.819	pCi/g	11/20/20 22:00	12/13/20 11:01	1

**Client Sample ID: HPPG-ESU-TU077A-013**

**Lab Sample ID: 160-40423-13**

Date Collected: 11/11/20 13:24

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.475</b>		0.209	0.214		0.106	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Actinium-227	0.287	U	0.446	0.447		0.358	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Bismuth-212	0.568	U	1.10	1.10		0.849	pCi/g	11/20/20 22:00	12/13/20 11:37	1
<b>Bismuth-214</b>	<b>0.423</b>		0.180	0.185		0.0956	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Cesium-137	0.00301	U	0.0730	0.0730	0.0700	0.0595	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Lead-210	-0.107	U	1.76	1.76		1.25	pCi/g	11/20/20 22:00	12/13/20 11:37	1
<b>Lead-212</b>	<b>0.441</b>		0.115	0.128		0.0584	pCi/g	11/20/20 22:00	12/13/20 11:37	1
<b>Lead-214</b>	<b>0.339</b>		0.144	0.148		0.0780	pCi/g	11/20/20 22:00	12/13/20 11:37	1
<b>Potassium-40</b>	<b>8.62</b>		1.76	1.97		0.335	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Protactinium-231	-0.0000000	U	2.53	2.53		2.09	pCi/g	11/20/20 22:00	12/13/20 11:37	1
	807									
Protactinium-234	0.162	U	0.259	0.260		0.185	pCi/g	11/20/20 22:00	12/13/20 11:37	1
<b>Radium-226</b>	<b>0.423</b>		0.180	0.185	0.200	0.0956	pCi/g	11/20/20 22:00	12/13/20 11:37	1
<b>Radium-228</b>	<b>0.475</b>		0.209	0.214		0.106	pCi/g	11/20/20 22:00	12/13/20 11:37	1
<b>Thallium-208</b>	<b>0.186</b>		0.0653	0.0681		0.0186	pCi/g	11/20/20 22:00	12/13/20 11:37	1
<b>Thorium 228</b>	<b>0.441</b>		0.115	0.128		0.0584	pCi/g	11/20/20 22:00	12/13/20 11:37	1
<b>Thorium-232</b>	<b>0.475</b>		0.209	0.214		0.106	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Thorium-234	-0.249	U	1.13	1.13		0.937	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Uranium-235	-0.0269	U	0.0501	0.0502		0.409	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Uranium-238	-0.249	U	1.13	1.13		0.937	pCi/g	11/20/20 22:00	12/13/20 11:37	1

**Client Sample ID: HPPG-ESU-TU077A-014**

**Lab Sample ID: 160-40423-14**

Date Collected: 11/11/20 13:26

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.475</b>		0.251	0.256		0.110	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Actinium-227	0.193	U	0.294	0.295		0.258	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Bismuth-212	-0.475	U	0.678	0.680		0.665	pCi/g	11/20/20 22:00	12/13/20 11:34	1
<b>Bismuth-214</b>	<b>0.458</b>		0.127	0.136		0.0458	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Cesium-137	0.0297	U	0.0597	0.0597	0.0700	0.0468	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Lead-210	-0.238	U	1.44	1.44		1.17	pCi/g	11/20/20 22:00	12/13/20 11:34	1
<b>Lead-212</b>	<b>0.412</b>		0.0827	0.0984		0.0404	pCi/g	11/20/20 22:00	12/13/20 11:34	1
<b>Lead-214</b>	<b>0.345</b>		0.0940	0.101		0.0487	pCi/g	11/20/20 22:00	12/13/20 11:34	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
 SDG: GJ46599771

**Client Sample ID: HPPG-ESU-TU077A-014**

**Lab Sample ID: 160-40423-14**

Date Collected: 11/11/20 13:26

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Potassium-40	8.18		1.31	1.56		0.364	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Protactinium-231	-0.866	U	2.66	2.66		2.17	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Protactinium-234	0.0756	U	0.219	0.219		0.178	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Radium-226	0.458		0.127	0.136	0.200	0.0458	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Radium-228	0.475		0.251	0.256		0.110	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Thallium-208	0.194		0.0474	0.0515		0.0117	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Thorium 228	0.412		0.0827	0.0984		0.0404	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Thorium-232	0.475		0.251	0.256		0.110	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Thorium-234	0.000	U	0.418	0.418		0.823	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Uranium-235	0.0582	U	0.176	0.176		0.344	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Uranium-238	0.000	U	0.418	0.418		0.823	pCi/g	11/20/20 22:00	12/13/20 11:34	1

**Client Sample ID: HPPG-ESU-TU077A-015**

**Lab Sample ID: 160-40423-15**

Date Collected: 11/11/20 13:28

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.543		0.148	0.158		0.0228	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Actinium-227	-0.257	U	0.534	0.535		0.308	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Bismuth-212	0.310	U	0.573	0.574		0.443	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Bismuth-214	0.309		0.101	0.106		0.0595	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Cesium-137	-0.0139	U	0.0455	0.0455	0.0700	0.0362	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Lead-210	1.01		1.16	1.17		0.903	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Lead-212	0.552		0.0855	0.111		0.0351	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Lead-214	0.515		0.0900	0.105		0.0472	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Potassium-40	8.99		1.22	1.53		0.168	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Protactinium-231	-0.156	U	0.527	0.527		2.00	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Protactinium-234	0.0850	U	0.246	0.246		0.200	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Radium-226	0.309		0.101	0.106	0.200	0.0595	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Radium-228	0.543		0.148	0.158		0.0228	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Thallium-208	0.193		0.0513	0.0551		0.0151	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Thorium 228	0.552		0.0855	0.111		0.0351	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Thorium-232	0.543		0.148	0.158		0.0228	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Thorium-234	0.930		0.395	0.408		0.265	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Uranium-235	0.000	U	0.168	0.168		0.348	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Uranium-238	0.930		0.395	0.408		0.265	pCi/g	11/20/20 22:00	12/13/20 11:35	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
 SDG: GJ46599771

**Client Sample ID: HPPG-ESU-TU077A-016**

**Lab Sample ID: 160-40423-16**

Date Collected: 11/11/20 13:29

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.621</b>		0.181	0.191		0.0498	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Actinium-227	-0.298	U	0.579	0.580		0.335	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Bismuth-212	0.180	U	0.600	0.600		0.478	pCi/g	11/20/20 19:07	12/13/20 12:52	1
<b>Bismuth-214</b>	<b>0.280</b>		0.0982	0.102		0.0583	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Cesium-137	0.0125	U	0.0342	0.0343	0.0700	0.0266	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Lead-210	-0.292	U	1.09	1.09		0.879	pCi/g	11/20/20 19:07	12/13/20 12:52	1
<b>Lead-212</b>	<b>0.469</b>		0.0789	0.0996		0.0335	pCi/g	11/20/20 19:07	12/13/20 12:52	1
<b>Lead-214</b>	<b>0.396</b>		0.0849	0.0943		0.0382	pCi/g	11/20/20 19:07	12/13/20 12:52	1
<b>Potassium-40</b>	<b>7.70</b>		1.08	1.34		0.0879	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Protactinium-231	-0.217	U	2.18	2.18		1.79	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Protactinium-234	0.0591	U	0.220	0.220		0.189	pCi/g	11/20/20 19:07	12/13/20 12:52	1
<b>Radium-226</b>	<b>0.280</b>		0.0982	0.102	0.200	0.0583	pCi/g	11/20/20 19:07	12/13/20 12:52	1
<b>Radium-228</b>	<b>0.621</b>		0.181	0.191		0.0498	pCi/g	11/20/20 19:07	12/13/20 12:52	1
<b>Thallium-208</b>	<b>0.134</b>		0.0651	0.0665		0.0263	pCi/g	11/20/20 19:07	12/13/20 12:52	1
<b>Thorium 228</b>	<b>0.469</b>		0.0789	0.0996		0.0335	pCi/g	11/20/20 19:07	12/13/20 12:52	1
<b>Thorium-232</b>	<b>0.621</b>		0.181	0.191		0.0498	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Thorium-234	0.228	U	0.713	0.713		0.580	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Uranium-235	0.0639	U	0.160	0.160		0.334	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Uranium-238	0.228	U	0.713	0.713		0.580	pCi/g	11/20/20 19:07	12/13/20 12:52	1

**Client Sample ID: HPPG-ESU-TU077A-017**

**Lab Sample ID: 160-40423-17**

Date Collected: 11/11/20 13:32

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.433</b>		0.234	0.239		0.0918	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Actinium-227	0.0386	U	0.111	0.111		0.351	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Bismuth-212	-0.102	U	0.899	0.899		0.731	pCi/g	11/20/20 19:07	12/13/20 12:48	1
<b>Bismuth-214</b>	<b>0.517</b>		0.139	0.149		0.0480	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Cesium-137	-0.0159	U	0.0549	0.0550	0.0700	0.0432	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Lead-210	0.0167	U	1.56	1.56		1.28	pCi/g	11/20/20 19:07	12/13/20 12:48	1
<b>Lead-212</b>	<b>0.340</b>		0.0971	0.107		0.0544	pCi/g	11/20/20 19:07	12/13/20 12:48	1
<b>Lead-214</b>	<b>0.353</b>		0.114	0.120		0.0628	pCi/g	11/20/20 19:07	12/13/20 12:48	1
<b>Potassium-40</b>	<b>6.37</b>		1.34	1.49		0.283	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Protactinium-231	-1.13	U	3.36	3.36		2.73	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Protactinium-234	0.0970	U	0.302	0.302		0.238	pCi/g	11/20/20 19:07	12/13/20 12:48	1
<b>Radium-226</b>	<b>0.517</b>		0.139	0.149	0.200	0.0480	pCi/g	11/20/20 19:07	12/13/20 12:48	1
<b>Radium-228</b>	<b>0.433</b>		0.234	0.239		0.0918	pCi/g	11/20/20 19:07	12/13/20 12:48	1
<b>Thallium-208</b>	<b>0.166</b>		0.0564	0.0590		0.0176	pCi/g	11/20/20 19:07	12/13/20 12:48	1
<b>Thorium 228</b>	<b>0.340</b>		0.0971	0.107		0.0544	pCi/g	11/20/20 19:07	12/13/20 12:48	1
<b>Thorium-232</b>	<b>0.433</b>		0.234	0.239		0.0918	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Thorium-234	0.378	U	0.619	0.620		0.402	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Uranium-235	-0.00858	U	0.330	0.330		0.416	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Uranium-238	0.378	U	0.619	0.620		0.402	pCi/g	11/20/20 19:07	12/13/20 12:48	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
 SDG: GJ46599771

**Client Sample ID: HPPG-ESU-TU077A-018**

**Lab Sample ID: 160-40423-18**

Date Collected: 11/11/20 13:34

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.590		0.206	0.214		0.0581	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Actinium-227	0.249	U	0.502	0.503		0.318	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Bismuth-212	1.52		0.506	0.530		0.0983	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Bismuth-214	0.600		0.146	0.159		0.0530	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Cesium-137	0.000	U	0.0369	0.0369	0.0700	0.0545	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Lead-210	-0.608	U	1.82	1.82		1.52	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Lead-212	0.375		0.102	0.113		0.0601	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Lead-214	0.529		0.109	0.122		0.0549	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Potassium-40	8.26		1.34	1.59		0.282	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Protactinium-231	0.541	U	1.80	1.80		1.97	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Protactinium-234	-0.108	U	0.220	0.220		0.278	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Radium-226	0.600		0.146	0.159	0.200	0.0530	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Radium-228	0.590		0.206	0.214		0.0581	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Thallium-208	0.222		0.0571	0.0616		0.0160	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Thorium 228	0.375		0.102	0.113		0.0601	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Thorium-232	0.590		0.206	0.214		0.0581	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Thorium-234	-1.14	U	0.828	0.838		0.929	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Uranium-235	-0.0206	U	0.0319	0.0320		0.317	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Uranium-238	-1.14	U	0.828	0.838		0.929	pCi/g	11/20/20 19:07	12/13/20 12:48	1

**Client Sample ID: HPPG-ESU-TU077A-019**

**Lab Sample ID: 160-40423-19**

Date Collected: 11/11/20 13:36

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.416		0.343	0.346		0.160	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Actinium-227	0.127	U	0.533	0.533		0.358	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Bismuth-212	-0.0284	U	0.938	0.938		0.770	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Bismuth-214	0.374		0.158	0.164		0.0774	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Cesium-137	0.0269	U	0.0680	0.0680	0.0700	0.0532	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Lead-210	0.688	U	1.51	1.51		1.06	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Lead-212	0.592		0.104	0.125		0.0377	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Lead-214	0.557		0.173	0.184		0.0770	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Potassium-40	11.9		1.74	2.21		0.317	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Protactinium-231	0.250	U	1.61	1.61		2.49	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Protactinium-234	-0.130	U	0.394	0.394		0.321	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Radium-226	0.374		0.158	0.164	0.200	0.0774	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Radium-228	0.416		0.343	0.346		0.160	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Thallium-208	0.188		0.103	0.105		0.0518	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Thorium 228	0.592		0.104	0.125		0.0377	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Thorium-232	0.416		0.343	0.346		0.160	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Thorium-234	1.16		0.651	0.667		0.432	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Uranium-235	-0.247	U	0.811	0.812		0.556	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Uranium-238	1.16		0.651	0.667		0.432	pCi/g	11/20/20 19:07	12/13/20 12:53	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
SDG: GJ46599771

**Client Sample ID: HPPG-ESU-TU077A-020**

**Lab Sample ID: 160-40423-20**

Date Collected: 11/11/20 13:37

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.527		0.321	0.325		0.144	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Actinium-227	-0.109	U	0.615	0.615		0.378	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Bismuth-212	0.259	U	0.620	0.621		0.473	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Bismuth-214	0.526		0.152	0.161		0.0605	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Cesium-137	0.0290	U	0.0611	0.0612	0.0700	0.0469	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Lead-210	1.19		1.36	1.37		0.939	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Lead-212	0.561		0.102	0.118		0.0449	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Lead-214	0.516		0.125	0.136		0.0589	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Potassium-40	9.41		1.62	1.88		0.233	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Protactinium-231	0.0908	U	1.22	1.22		2.49	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Protactinium-234	0.00543	U	0.314	0.314		0.259	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Radium-226	0.526		0.152	0.161	0.200	0.0605	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Radium-228	0.527		0.321	0.325		0.144	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Thallium-208	0.214		0.0701	0.0734		0.0220	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Thorium 228	0.561		0.102	0.118		0.0449	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Thorium-232	0.527		0.321	0.325		0.144	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Thorium-234	-0.647	U	0.635	0.639		0.884	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Uranium-235	0.0219	U	0.113	0.113		0.409	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Uranium-238	-0.647	U	0.635	0.639		0.884	pCi/g	11/20/20 19:07	12/13/20 13:35	1

**Client Sample ID: HPPG-ESU-TU077A-021**

**Lab Sample ID: 160-40423-21**

Date Collected: 11/11/20 13:39

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: 905 - Strontium-90 (GFPC)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Strontium-90	-0.0369	U	0.138	0.138	0.331	0.116	pCi/g	12/16/20 14:29	01/04/21 13:55	1
<i>Carrier</i>	<i>%Yield</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>	
<i>Sr Carrier</i>	102		40 - 110				12/16/20 14:29	01/04/21 13:55	1	
<i>Y Carrier</i>	92.7		40 - 110				12/16/20 14:29	01/04/21 13:55	1	

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.760		0.212	0.226		0.0763	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Actinium-227	0.216	U	0.539	0.539		0.364	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Bismuth-212	-0.00573	U	0.976	0.976		0.664	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Bismuth-214	0.169		0.107	0.108		0.143	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Cesium-137	-0.0169	U	0.0621	0.0621	0.0700	0.0495	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Lead-210	-1.19	U	1.82	1.83		1.54	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Lead-212	0.458		0.0974	0.114		0.0472	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Lead-214	0.621		0.131	0.146		0.0874	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Potassium-40	11.3		1.58	1.95		0.331	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Protactinium-231	0.000	U	0.690	0.690		2.50	pCi/g	11/20/20 19:07	12/13/20 13:38	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
SDG: GJ46599771

Client Sample ID: HPPG-ESU-TU077A-021

Lab Sample ID: 160-40423-21

Date Collected: 11/11/20 13:39

Matrix: Solid

Date Received: 11/17/20 09:05

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.00465	U	0.00758	0.00760		0.218	pCi/g	11/20/20 19:07	12/13/20 13:38	1
<b>Radium-226</b>	<b>0.169</b>		0.107	0.108	0.200	0.143	pCi/g	11/20/20 19:07	12/13/20 13:38	1
<b>Radium-228</b>	<b>0.760</b>		0.212	0.226		0.0763	pCi/g	11/20/20 19:07	12/13/20 13:38	1
<b>Thallium-208</b>	<b>0.193</b>		0.0653	0.0683		0.0245	pCi/g	11/20/20 19:07	12/13/20 13:38	1
<b>Thorium 228</b>	<b>0.458</b>		0.0974	0.114		0.0472	pCi/g	11/20/20 19:07	12/13/20 13:38	1
<b>Thorium-232</b>	<b>0.760</b>		0.212	0.226		0.0763	pCi/g	11/20/20 19:07	12/13/20 13:38	1
<b>Thorium-234</b>	<b>0.477</b>		0.599	0.601		0.467	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Uranium-235	0.0565	U	0.254	0.254		0.313	pCi/g	11/20/20 19:07	12/13/20 13:38	1
<b>Uranium-238</b>	<b>0.477</b>		0.599	0.601		0.467	pCi/g	11/20/20 19:07	12/13/20 13:38	1

Client Sample ID: HPPG-ESU-TU077A-022

Lab Sample ID: 160-40423-22

Date Collected: 11/11/20 13:41

Matrix: Solid

Date Received: 11/17/20 09:05

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.787</b>		0.240	0.253		0.0426	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Actinium-227	0.0633	U	0.276	0.276		0.439	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Bismuth-212	-0.502	U	0.569	0.572		0.893	pCi/g	11/20/20 19:07	12/13/20 13:35	1
<b>Bismuth-214</b>	<b>0.329</b>		0.146	0.150		0.0826	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Cesium-137	-0.0478	U	0.0952	0.0954	0.0700	0.0745	pCi/g	11/20/20 19:07	12/13/20 13:35	1
<b>Lead-210</b>	<b>0.933</b>		1.09	1.09		0.724	pCi/g	11/20/20 19:07	12/13/20 13:35	1
<b>Lead-212</b>	<b>0.395</b>		0.0977	0.110		0.0464	pCi/g	11/20/20 19:07	12/13/20 13:35	1
<b>Lead-214</b>	<b>0.408</b>		0.126	0.133		0.0737	pCi/g	11/20/20 19:07	12/13/20 13:35	1
<b>Potassium-40</b>	<b>8.37</b>		1.61	1.83		0.291	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Protactinium-231	-0.440	U	2.75	2.75		2.24	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Protactinium-234	0.0606	U	0.0970	0.0972		0.217	pCi/g	11/20/20 19:07	12/13/20 13:35	1
<b>Radium-226</b>	<b>0.329</b>		0.146	0.150	0.200	0.0826	pCi/g	11/20/20 19:07	12/13/20 13:35	1
<b>Radium-228</b>	<b>0.787</b>		0.240	0.253		0.0426	pCi/g	11/20/20 19:07	12/13/20 13:35	1
<b>Thallium-208</b>	<b>0.180</b>		0.0606	0.0635		0.0162	pCi/g	11/20/20 19:07	12/13/20 13:35	1
<b>Thorium 228</b>	<b>0.395</b>		0.0977	0.110		0.0464	pCi/g	11/20/20 19:07	12/13/20 13:35	1
<b>Thorium-232</b>	<b>0.787</b>		0.240	0.253		0.0426	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Thorium-234	-0.781	U	0.629	0.635		0.889	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Uranium-235	0.115	U	0.335	0.335		0.270	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Uranium-238	-0.781	U	0.629	0.635		0.889	pCi/g	11/20/20 19:07	12/13/20 13:35	1

Client Sample ID: HPPG-ESU-TU077A-023

Lab Sample ID: 160-40423-23

Date Collected: 11/11/20 13:43

Matrix: Solid

Date Received: 11/17/20 09:05

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.361</b>		0.147	0.152		0.107	pCi/g	11/20/20 19:07	12/13/20 12:50	1
Actinium-227	-0.190	U	0.873	0.873		0.335	pCi/g	11/20/20 19:07	12/13/20 12:50	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
SDG: GJ46599771

**Client Sample ID: HPPG-ESU-TU077A-023**

**Lab Sample ID: 160-40423-23**

Date Collected: 11/11/20 13:43

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-212	-0.584	U	0.486	0.490		0.661	pCi/g	11/20/20 19:07	12/13/20 12:50	1
<b>Bismuth-214</b>	<b>0.278</b>		0.102	0.106		0.0489	pCi/g	11/20/20 19:07	12/13/20 12:50	1
Cesium-137	-0.0488	U	0.0807	0.0809	0.0700	0.0637	pCi/g	11/20/20 19:07	12/13/20 12:50	1
Lead-210	0.534	U	1.19	1.19		0.949	pCi/g	11/20/20 19:07	12/13/20 12:50	1
<b>Lead-212</b>	<b>0.437</b>		0.0789	0.0971		0.0335	pCi/g	11/20/20 19:07	12/13/20 12:50	1
<b>Lead-214</b>	<b>0.451</b>		0.110	0.119		0.0481	pCi/g	11/20/20 19:07	12/13/20 12:50	1
<b>Potassium-40</b>	<b>8.14</b>		1.20	1.46		0.268	pCi/g	11/20/20 19:07	12/13/20 12:50	1
Protactinium-231	-0.793	U	2.52	2.52		2.05	pCi/g	11/20/20 19:07	12/13/20 12:50	1
Protactinium-234	0.0673	U	0.240	0.240		0.196	pCi/g	11/20/20 19:07	12/13/20 12:50	1
<b>Radium-226</b>	<b>0.278</b>		0.102	0.106	0.200	0.0489	pCi/g	11/20/20 19:07	12/13/20 12:50	1
<b>Radium-228</b>	<b>0.361</b>		0.147	0.152		0.107	pCi/g	11/20/20 19:07	12/13/20 12:50	1
<b>Thallium-208</b>	<b>0.201</b>		0.0526	0.0566		0.0165	pCi/g	11/20/20 19:07	12/13/20 12:50	1
<b>Thorium 228</b>	<b>0.437</b>		0.0789	0.0971		0.0335	pCi/g	11/20/20 19:07	12/13/20 12:50	1
<b>Thorium-232</b>	<b>0.361</b>		0.147	0.152		0.107	pCi/g	11/20/20 19:07	12/13/20 12:50	1
Thorium-234	-0.309	U	0.966	0.966		0.788	pCi/g	11/20/20 19:07	12/13/20 12:50	1
Uranium-235	0.0501	U	0.185	0.185		0.340	pCi/g	11/20/20 19:07	12/13/20 12:50	1
Uranium-238	-0.309	U	0.966	0.966		0.788	pCi/g	11/20/20 19:07	12/13/20 12:50	1

**Client Sample ID: HPPG-ESU-TU077A-024**

**Lab Sample ID: 160-40423-24**

Date Collected: 11/11/20 13:46

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.389</b>		0.229	0.232		0.0876	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Actinium-227	-0.314	U	0.621	0.622		0.372	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Bismuth-212	0.000	U	0.562	0.562		0.771	pCi/g	11/20/20 20:10	12/13/20 15:52	1
<b>Bismuth-214</b>	<b>0.460</b>		0.127	0.136		0.0426	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Cesium-137	-0.0352	U	0.110	0.110	0.0700	0.0885	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Lead-210	0.393	U	1.42	1.42		1.02	pCi/g	11/20/20 20:10	12/13/20 15:52	1
<b>Lead-212</b>	<b>0.552</b>		0.105	0.120		0.0467	pCi/g	11/20/20 20:10	12/13/20 15:52	1
<b>Lead-214</b>	<b>0.522</b>		0.120	0.132		0.0620	pCi/g	11/20/20 20:10	12/13/20 15:52	1
<b>Potassium-40</b>	<b>10.1</b>		1.73	2.01		0.246	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Protactinium-231	-0.0717	U	3.00	3.00		2.47	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Protactinium-234	-0.0371	U	0.113	0.113		0.257	pCi/g	11/20/20 20:10	12/13/20 15:52	1
<b>Radium-226</b>	<b>0.460</b>		0.127	0.136	0.200	0.0426	pCi/g	11/20/20 20:10	12/13/20 15:52	1
<b>Radium-228</b>	<b>0.389</b>		0.229	0.232		0.0876	pCi/g	11/20/20 20:10	12/13/20 15:52	1
<b>Thallium-208</b>	<b>0.105</b>		0.0889	0.0895		0.0441	pCi/g	11/20/20 20:10	12/13/20 15:52	1
<b>Thorium 228</b>	<b>0.552</b>		0.105	0.120		0.0467	pCi/g	11/20/20 20:10	12/13/20 15:52	1
<b>Thorium-232</b>	<b>0.389</b>		0.229	0.232		0.0876	pCi/g	11/20/20 20:10	12/13/20 15:52	1
<b>Thorium-234</b>	<b>0.667</b>		0.562	0.567		0.431	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Uranium-235	0.0697	U	0.157	0.157		0.417	pCi/g	11/20/20 20:10	12/13/20 15:52	1
<b>Uranium-238</b>	<b>0.667</b>		0.562	0.567		0.431	pCi/g	11/20/20 20:10	12/13/20 15:52	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
SDG: GJ46599771

**Client Sample ID: HPPG-ESU-TU077A-025**

**Lab Sample ID: 160-40423-25**

Date Collected: 11/11/20 13:49

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.602</b>		0.193	0.202		0.0654	pCi/g	11/20/20 20:10	12/13/20 15:49	1
Actinium-227	0.137	U	0.372	0.372		0.343	pCi/g	11/20/20 20:10	12/13/20 15:49	1
Bismuth-212	-0.0956	U	0.787	0.787		0.575	pCi/g	11/20/20 20:10	12/13/20 15:49	1
<b>Bismuth-214</b>	<b>0.510</b>		0.105	0.117		0.0125	pCi/g	11/20/20 20:10	12/13/20 15:49	1
Cesium-137	-0.0461	U	0.0781	0.0782	0.0700	0.0613	pCi/g	11/20/20 20:10	12/13/20 15:49	1
Lead-210	0.665	U	1.20	1.20		0.844	pCi/g	11/20/20 20:10	12/13/20 15:49	1
<b>Lead-212</b>	<b>0.447</b>		0.0929	0.109		0.0473	pCi/g	11/20/20 20:10	12/13/20 15:49	1
<b>Lead-214</b>	<b>0.480</b>		0.112	0.123		0.0440	pCi/g	11/20/20 20:10	12/13/20 15:49	1
<b>Potassium-40</b>	<b>7.60</b>		1.23	1.45		0.291	pCi/g	11/20/20 20:10	12/13/20 15:49	1
Protactinium-231	0.000	U	0.752	0.752		2.13	pCi/g	11/20/20 20:10	12/13/20 15:49	1
<b>Protactinium-234</b>	<b>0.202</b>		0.121	0.122		0.179	pCi/g	11/20/20 20:10	12/13/20 15:49	1
<b>Radium-226</b>	<b>0.510</b>		0.105	0.117	0.200	0.0125	pCi/g	11/20/20 20:10	12/13/20 15:49	1
<b>Radium-228</b>	<b>0.602</b>		0.193	0.202		0.0654	pCi/g	11/20/20 20:10	12/13/20 15:49	1
<b>Thallium-208</b>	<b>0.137</b>		0.0572	0.0589		0.0253	pCi/g	11/20/20 20:10	12/13/20 15:49	1
<b>Thorium 228</b>	<b>0.447</b>		0.0929	0.109		0.0473	pCi/g	11/20/20 20:10	12/13/20 15:49	1
<b>Thorium-232</b>	<b>0.602</b>		0.193	0.202		0.0654	pCi/g	11/20/20 20:10	12/13/20 15:49	1
<b>Thorium-234</b>	<b>0.385</b>		0.425	0.427		0.355	pCi/g	11/20/20 20:10	12/13/20 15:49	1
Uranium-235	0.199	U	0.313	0.313		0.237	pCi/g	11/20/20 20:10	12/13/20 15:49	1
<b>Uranium-238</b>	<b>0.385</b>		0.425	0.427		0.355	pCi/g	11/20/20 20:10	12/13/20 15:49	1

**Client Sample ID: HPPG-F-033**

**Lab Sample ID: 160-40423-26**

Date Collected: 11/11/20 13:03

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: 905 - Strontium-90 (GFPC)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac	
			Uncert.	Uncert.							
			(2σ+/-)	(2σ+/-)							
Strontium-90	0.00140	U	0.116	0.116	0.331	0.0952	pCi/g	12/16/20 14:29	01/04/21 13:55	1	
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>						<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	92.1		40 - 110						12/16/20 14:29	01/04/21 13:55	1
Y Carrier	93.1		40 - 110						12/16/20 14:29	01/04/21 13:55	1

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.396</b>		0.164	0.169		0.0731	pCi/g	11/20/20 20:10	12/13/20 15:50	1
Actinium-227	0.0413	U	0.160	0.160		0.323	pCi/g	11/20/20 20:10	12/13/20 15:50	1
Bismuth-212	-0.00361	U	0.652	0.652		0.655	pCi/g	11/20/20 20:10	12/13/20 15:50	1
Bismuth-214	-0.0121	U	0.0736	0.0736		0.171	pCi/g	11/20/20 20:10	12/13/20 15:50	1
Cesium-137	0.00125	U	0.0525	0.0525	0.0700	0.0429	pCi/g	11/20/20 20:10	12/13/20 15:50	1
Lead-210	-0.0256	U	1.31	1.31		0.926	pCi/g	11/20/20 20:10	12/13/20 15:50	1
<b>Lead-212</b>	<b>0.433</b>		0.0889	0.105		0.0401	pCi/g	11/20/20 20:10	12/13/20 15:50	1
<b>Lead-214</b>	<b>0.350</b>		0.120	0.125		0.0638	pCi/g	11/20/20 20:10	12/13/20 15:50	1
<b>Potassium-40</b>	<b>7.92</b>		1.52	1.73		0.391	pCi/g	11/20/20 20:10	12/13/20 15:50	1
Protactinium-231	0.000	U	1.14	1.14		2.01	pCi/g	11/20/20 20:10	12/13/20 15:50	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
SDG: GJ46599771

**Client Sample ID: HPPG-F-033**

**Lab Sample ID: 160-40423-26**

Date Collected: 11/11/20 13:03

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.0738	U	0.180	0.180		0.153	pCi/g	11/20/20 20:10	12/13/20 15:50	1
Radium-226	-0.0121	U	0.0736	0.0736	0.200	0.171	pCi/g	11/20/20 20:10	12/13/20 15:50	1
<b>Radium-228</b>	<b>0.396</b>		0.164	0.169		0.0731	pCi/g	11/20/20 20:10	12/13/20 15:50	1
<b>Thallium-208</b>	<b>0.199</b>		0.0580	0.0616		0.0177	pCi/g	11/20/20 20:10	12/13/20 15:50	1
<b>Thorium 228</b>	<b>0.433</b>		0.0889	0.105		0.0401	pCi/g	11/20/20 20:10	12/13/20 15:50	1
<b>Thorium-232</b>	<b>0.396</b>		0.164	0.169		0.0731	pCi/g	11/20/20 20:10	12/13/20 15:50	1
<b>Thorium-234</b>	<b>0.437</b>		0.460	0.463		0.292	pCi/g	11/20/20 20:10	12/13/20 15:50	1
Uranium-235	-0.0160	U	0.210	0.210		0.216	pCi/g	11/20/20 20:10	12/13/20 15:50	1
<b>Uranium-238</b>	<b>0.437</b>		0.460	0.463		0.292	pCi/g	11/20/20 20:10	12/13/20 15:50	1

**Client Sample ID: HPPG-F-034**

**Lab Sample ID: 160-40423-27**

Date Collected: 11/11/20 13:32

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.614</b>		0.128	0.142		0.0234	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Actinium-227	0.235	U	0.468	0.469		0.269	pCi/g	11/20/20 20:10	12/13/20 15:52	1
<b>Bismuth-212</b>	<b>0.868</b>		0.427	0.436		0.156	pCi/g	11/20/20 20:10	12/13/20 15:52	1
<b>Bismuth-214</b>	<b>0.380</b>		0.102	0.109		0.0411	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Cesium-137	-0.00706	U	0.0479	0.0479	0.0700	0.0388	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Lead-210	-0.352	U	1.32	1.32		1.07	pCi/g	11/20/20 20:10	12/13/20 15:52	1
<b>Lead-212</b>	<b>0.503</b>		0.0797	0.103		0.0285	pCi/g	11/20/20 20:10	12/13/20 15:52	1
<b>Lead-214</b>	<b>0.470</b>		0.0948	0.107		0.0427	pCi/g	11/20/20 20:10	12/13/20 15:52	1
<b>Potassium-40</b>	<b>8.94</b>		1.24	1.54		0.262	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Protactinium-231	-0.801	U	2.50	2.50		2.03	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Protactinium-234	0.0573	U	0.206	0.206		0.167	pCi/g	11/20/20 20:10	12/13/20 15:52	1
<b>Radium-226</b>	<b>0.380</b>		0.102	0.109	0.200	0.0411	pCi/g	11/20/20 20:10	12/13/20 15:52	1
<b>Radium-228</b>	<b>0.614</b>		0.128	0.142		0.0234	pCi/g	11/20/20 20:10	12/13/20 15:52	1
<b>Thallium-208</b>	<b>0.158</b>		0.0457	0.0486		0.0149	pCi/g	11/20/20 20:10	12/13/20 15:52	1
<b>Thorium 228</b>	<b>0.503</b>		0.0797	0.103		0.0285	pCi/g	11/20/20 20:10	12/13/20 15:52	1
<b>Thorium-232</b>	<b>0.614</b>		0.128	0.142		0.0234	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Thorium-234	-0.345	U	1.19	1.19		0.971	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Uranium-235	0.168	U	0.370	0.370		0.359	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Uranium-238	-0.345	U	1.19	1.19		0.971	pCi/g	11/20/20 20:10	12/13/20 15:52	1

# QC Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
 SDG: GJ46599771

## Method: 905 - Strontium-90 (GFPC)

**Lab Sample ID: MB 160-492111/22-A**  
**Matrix: Solid**  
**Analysis Batch: 493835**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 492111**

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac	
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)							
Strontium-90	-0.03798	U	0.125	0.125	0.331	0.106	pCi/g	12/16/20 14:29	01/04/21 13:58	1	
Carrier		MB MB	Limits			LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
		%Yield Qualifier									
Sr Carrier		96.8		40 - 110							
Y Carrier		94.6	40 - 110		12/16/20 14:29	01/04/21 13:58	1				

**Lab Sample ID: LCS 160-492111/1-A**  
**Matrix: Solid**  
**Analysis Batch: 493723**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 492111**

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits	
				Uncert. (2σ+/-)						
Strontium-90	7.75	6.756		0.712	0.331	0.115	pCi/g	87	75 - 125	
Carrier		LCS LCS	Limits			LOQ	DLC	Unit	%Rec	%Rec. Limits
		%Yield Qualifier								
Sr Carrier		102		40 - 110						
Y Carrier		94.6	40 - 110		12/16/20 14:29	01/04/21 13:58	1			

**Lab Sample ID: MB 160-493370/23-A**  
**Matrix: Solid**  
**Analysis Batch: 494269**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 493370**

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac	
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)							
Strontium-90	0.01492	U	0.148	0.148	0.331	0.120	pCi/g	12/29/20 21:17	01/07/21 16:12	1	
Carrier		MB MB	Limits			LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
		%Yield Qualifier									
Sr Carrier		103		40 - 110							
Y Carrier		84.9	40 - 110		12/29/20 21:17	01/07/21 16:12	1				

**Lab Sample ID: LCS 160-493370/1-A**  
**Matrix: Solid**  
**Analysis Batch: 494260**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 493370**

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits	
				Uncert. (2σ+/-)						
Strontium-90	7.75	6.391		0.695	0.331	0.127	pCi/g	82	75 - 125	
Carrier		LCS LCS	Limits			LOQ	DLC	Unit	%Rec	%Rec. Limits
		%Yield Qualifier								
Sr Carrier		102		40 - 110						
Y Carrier		87.1	40 - 110		12/29/20 21:17	01/07/21 16:12	1			

# QC Sample Results

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
SDG: GJ46599771

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

**Lab Sample ID: MB 160-489912/1-A**  
**Matrix: Solid**  
**Analysis Batch: 491636**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 489912**

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	-0.0006816	U	0.207	0.207		0.115	pCi/g	11/20/20 19:07	12/13/20 12:14	1
Actinium-227	0.03531	U	0.0781	0.0782		0.342	pCi/g	11/20/20 19:07	12/13/20 12:14	1
Bismuth-212	-0.03201	U	0.844	0.844		0.692	pCi/g	11/20/20 19:07	12/13/20 12:14	1
Bismuth-214	-0.2024	U	0.135	0.137		0.288	pCi/g	11/20/20 19:07	12/13/20 12:14	1
Cesium-137	0.0000	U	0.0332	0.0332	0.0700	0.0345	pCi/g	11/20/20 19:07	12/13/20 12:14	1
Lead-210	0.4397	U	1.20	1.21		0.935	pCi/g	11/20/20 19:07	12/13/20 12:14	1
Lead-212	0.01072	U	0.101	0.101		0.0815	pCi/g	11/20/20 19:07	12/13/20 12:14	1
Lead-214	-0.09834	U	0.290	0.290		0.123	pCi/g	11/20/20 19:07	12/13/20 12:14	1
Potassium-40	-1.193	U	1.05	1.05		0.872	pCi/g	11/20/20 19:07	12/13/20 12:14	1
Protactinium-231	-1.070	U	3.65	3.65		2.97	pCi/g	11/20/20 19:07	12/13/20 12:14	1
Protactinium-234	0.07615	U	0.205	0.205		0.164	pCi/g	11/20/20 19:07	12/13/20 12:14	1
Radium-226	-0.2024	U	0.135	0.137	0.200	0.288	pCi/g	11/20/20 19:07	12/13/20 12:14	1
Radium-228	-0.0006816	U	0.207	0.207		0.115	pCi/g	11/20/20 19:07	12/13/20 12:14	1
Thallium-208	-0.04592	U	0.0575	0.0577		0.0528	pCi/g	11/20/20 19:07	12/13/20 12:14	1
Thorium 228	0.01072	U	0.101	0.101		0.0815	pCi/g	11/20/20 19:07	12/13/20 12:14	1
Thorium-232	-0.0006816	U	0.207	0.207		0.115	pCi/g	11/20/20 19:07	12/13/20 12:14	1
Thorium-234	-0.6086	U	0.743	0.746		0.909	pCi/g	11/20/20 19:07	12/13/20 12:14	1
Uranium-235	-0.1711	U	0.329	0.329		0.371	pCi/g	11/20/20 19:07	12/13/20 12:14	1
Uranium-238	-0.6086	U	0.743	0.746		0.909	pCi/g	11/20/20 19:07	12/13/20 12:14	1

**Lab Sample ID: LCS 160-489912/2-A**  
**Matrix: Solid**  
**Analysis Batch: 491639**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 489912**

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec Limits
				Uncert. (2σ+/-)					
Americium-241	96.4	96.62		10.2		0.593	pCi/g	100	87 - 116
Cesium-137	26.7	27.08		2.92	0.0700	0.0924	pCi/g	101	87 - 120
Cobalt-60	9.47	9.320		1.01		0.0186	pCi/g	98	87 - 115

**Lab Sample ID: 160-40423-23 DU**  
**Matrix: Solid**  
**Analysis Batch: 491630**

**Client Sample ID: HPPG-ESU-TU077A-023**  
**Prep Type: Total/NA**  
**Prep Batch: 489912**

Analyte	Sample Sample		DU DU		Total	LOQ	DLC	Unit	RER	RER Limit
	Result	Qual	Result	Qual	Uncert. (2σ+/-)					
Actinium 228	0.361		0.2358		0.250		0.129	pCi/g	0.31	1
Actinium-227	-0.190	U	0.2097	U	0.423		0.309	pCi/g	0.31	1
Bismuth-212	-0.584	U	0.5622	U	1.08		0.847	pCi/g	0.73	1
Bismuth-214	0.278		0.4109		0.130		0.0495	pCi/g	0.56	1
Cesium-137	-0.0488	U	0.004048	U	0.0614	0.0700	0.0501	pCi/g	0.37	1
Lead-210	0.534	U	-0.7360	U	2.15		1.79	pCi/g	0.38	1
Lead-212	0.437		0.4202		0.114		0.0585	pCi/g	0.08	1
Lead-214	0.451		0.4708		0.144		0.0578	pCi/g	0.07	1
Potassium-40	8.14		8.221		1.59		0.129	pCi/g	0.03	1
Protactinium-231	-0.793	U	-0.8525	U	3.26		2.66	pCi/g	0.01	1
Protactinium-234	0.0673	U	0.06747	U	0.182		0.266	pCi/g	0	1
Radium-226	0.278		0.4109		0.130	0.200	0.0495	pCi/g	0.56	1

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# QC Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
 SDG: GJ46599771

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: 160-40423-23 DU  
 Matrix: Solid  
 Analysis Batch: 491630

Client Sample ID: HPPG-ESU-TU077A-023  
 Prep Type: Total/NA  
 Prep Batch: 489912

Analyte	Sample		DU		Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER Limit
	Result	Qual	Result	Qual						
Radium-228	0.361		0.2358		0.250		0.129	pCi/g	0.31	1
Thallium-208	0.201		0.1610		0.0909		0.0386	pCi/g	0.27	1
Thorium 228	0.437		0.4202		0.114		0.0585	pCi/g	0.08	1
Thorium-232	0.361		0.2358		0.250		0.129	pCi/g	0.31	1
Thorium-234	-0.309	U	1.149		0.717		0.473	pCi/g	0.87	1
Uranium-235	0.0501	U	0.02965	U	0.0885		0.328	pCi/g	0.07	1
Uranium-238	-0.309	U	1.149		0.717		0.473	pCi/g	0.87	1

Lab Sample ID: MB 160-489913/1-A  
 Matrix: Solid  
 Analysis Batch: 491636

Client Sample ID: Method Blank  
 Prep Type: Total/NA  
 Prep Batch: 489913

Analyte	MB		Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Actinium 228	0.07422	U	0.200	0.201		0.115	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Actinium-227	-0.05999	U	0.582	0.582		0.342	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Bismuth-212	-0.7229	U	1.18	1.18		0.903	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Bismuth-214	-0.005494	U	0.183	0.183		0.150	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Cesium-137	0.01234	U	0.0551	0.0551	0.0700	0.0434	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Lead-210	0.5120	U	1.32	1.32		1.03	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Lead-212	-0.05190	U	0.100	0.101		0.115	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Lead-214	0.01041	U	0.107	0.107		0.0942	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Potassium-40	-0.5850	U	0.606	0.609		0.581	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Protactinium-231	0.0000	U	0.234	0.234		1.89	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Protactinium-234	0.04664	U	0.210	0.210		0.201	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Radium-226	-0.005494	U	0.183	0.183	0.200	0.150	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Radium-228	0.07422	U	0.200	0.201		0.115	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Thallium-208	0.04653		0.0294	0.0298		0.0326	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Thorium 228	-0.05190	U	0.100	0.101		0.115	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Thorium-232	0.07422	U	0.200	0.201		0.115	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Thorium-234	-0.6537	U	0.713	0.717		1.18	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Uranium-235	0.09038	U	0.181	0.182		0.374	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Uranium-238	-0.6537	U	0.713	0.717		1.18	pCi/g	11/20/20 20:10	12/13/20 15:47	1

Lab Sample ID: LCS 160-489913/2-A  
 Matrix: Solid  
 Analysis Batch: 491634

Client Sample ID: Lab Control Sample  
 Prep Type: Total/NA  
 Prep Batch: 489913

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits
Cesium-137	26.7	26.33		2.81	0.0700	0.0656	pCi/g	99	87 - 120
Cobalt-60	9.47	9.284		0.983		0.0303	pCi/g	98	87 - 115

# QC Sample Results

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
SDG: GJ46599771

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-489914/1-A  
Matrix: Solid  
Analysis Batch: 491640

Client Sample ID: Method Blank  
Prep Type: Total/NA  
Prep Batch: 489914

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.06942	U	0.163	0.163		0.106	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Actinium-227	-0.3324	U	0.662	0.663		0.394	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Bismuth-212	0.0000	U	0.133	0.133		0.380	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Bismuth-214	0.001233	U	0.00103	0.00103		0.229	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Cesium-137	-0.03158	U	0.0717	0.0718	0.0700	0.0550	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Lead-210	1.051	U	1.49	1.49		1.13	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Lead-212	-0.02229	U	0.102	0.102		0.0910	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Lead-214	0.006246	U	0.117	0.117		0.0949	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Potassium-40	-0.1884	U	1.06	1.06		0.298	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Protactinium-231	0.2573	U	1.09	1.09		1.60	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Protactinium-234	0.1307	U	0.117	0.118		0.131	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Radium-226	0.001233	U	0.00103	0.00103	0.200	0.229	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Radium-228	0.06942	U	0.163	0.163		0.106	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Thallium-208	0.03977		0.0717	0.0719		0.0238	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Thorium 228	-0.02229	U	0.102	0.102		0.0910	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Thorium-232	0.06942	U	0.163	0.163		0.106	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Thorium-234	-0.6464	U	0.460	0.466		0.423	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Uranium-235	-0.1697	U	0.362	0.362		0.232	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Uranium-238	-0.6464	U	0.460	0.466		0.423	pCi/g	11/20/20 21:15	12/13/20 17:39	1

Lab Sample ID: LCS 160-489914/2-A  
Matrix: Solid  
Analysis Batch: 491641

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA  
Prep Batch: 489914

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec Limits
Americium-241	96.4	97.01		10.2		0.573	pCi/g	101	87 - 116
Cesium-137	26.7	26.73		2.85	0.0700	0.0837	pCi/g	100	87 - 120
Cobalt-60	9.47	9.164		0.971		0.0522	pCi/g	97	87 - 115

Lab Sample ID: 160-40423-9 DU  
Matrix: Solid  
Analysis Batch: 491631

Client Sample ID: HPPG-ESU-TU077A-009  
Prep Type: Total/NA  
Prep Batch: 489914

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER Limit
Actinium 228	0.787		0.5720		0.178		0.0520	pCi/g	0.49	1
Actinium-227	-0.402	U	0.4040		0.357		0.250	pCi/g	0.66	1
Bismuth-212	0.443	U	-0.2393	U	0.693		0.551	pCi/g	0.43	1
Bismuth-214	0.329		0.04886	U	0.139		0.149	pCi/g	0.91	1
Cesium-137	-0.0116	U	0.01145	U	0.0556	0.0700	0.0449	pCi/g	0.16	1
Lead-210	1.04		-0.5993	U	1.29		1.03	pCi/g	0.62	1
Lead-212	0.511		0.4735		0.104		0.0373	pCi/g	0.16	1
Lead-214	0.416		0.3914		0.106		0.0873	pCi/g	0.1	1
Potassium-40	9.73		9.505		1.58		0.0950	pCi/g	0.06	1
Protactinium-231	0.704	U	0.3579	U	1.32		2.06	pCi/g	0.1	1
Protactinium-234	-0.0977	U	0.07915	U	0.223		0.181	pCi/g	0.37	1
Radium-226	0.329		0.04886	U	0.139	0.200	0.149	pCi/g	0.91	1

Eurofins TestAmerica, St. Louis

# QC Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
 SDG: GJ46599771

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

**Lab Sample ID: 160-40423-9 DU** **Client Sample ID: HPPG-ESU-TU077A-009**  
**Matrix: Solid** **Prep Type: Total/NA**  
**Analysis Batch: 491631** **Prep Batch: 489914**

Analyte	Sample Result	Sample Qual	DU		Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER Limit
			Result	Qual						
Radium-228	0.787		0.5720		0.178		0.0520	pCi/g	0.49	1
Thallium-208	0.157		0.1839		0.0594		0.0177	pCi/g	0.21	1
Thorium 228	0.511		0.4735		0.104		0.0373	pCi/g	0.16	1
Thorium-232	0.787		0.5720		0.178		0.0520	pCi/g	0.49	1
Thorium-234	0.507		0.6332	U	0.671		1.01	pCi/g	0.10	1
Uranium-235	0.212	U	0.0000	U	0.139		0.346	pCi/g	0.40	1
Uranium-238	0.507		0.6332	U	0.671		1.01	pCi/g	0.10	1

**Lab Sample ID: MB 160-489915/1-A** **Client Sample ID: Method Blank**  
**Matrix: Solid** **Prep Type: Total/NA**  
**Analysis Batch: 491636** **Prep Batch: 489915**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	0.08204	U	0.297	0.297		0.313	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Bismuth-212	0.0000	U	0.405	0.405		0.597	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Bismuth-214	-0.1826	U	0.128	0.130		0.216	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Cesium-137	0.03104	U	0.0912	0.0913	0.0700	0.0722	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Lead-210	-0.2922	U	1.53	1.53		1.27	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Lead-212	0.005306	U	0.0847	0.0847		0.0687	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Lead-214	-0.0009958	U	0.0868	0.0868		0.0701	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Potassium-40	-0.2533	U	0.984	0.984		0.581	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Protactinium-231	0.0000003	U	3.53	3.53		2.91	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Protactinium-234	-0.1077	U	0.277	0.278		0.224	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Radium-226	-0.1826	U	0.128	0.130	0.200	0.216	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Radium-228	0.08989		0.0971	0.0975		0.0478	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Thallium-208	0.006264	U	0.0531	0.0531		0.0326	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Thorium 228	0.005306	U	0.0847	0.0847		0.0687	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Thorium-232	0.08989		0.0971	0.0975		0.0478	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Thorium-234	-0.6086	U	0.667	0.671		0.949	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Uranium-235	0.09751	U	0.261	0.261		0.332	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Uranium-238	-0.6086	U	0.667	0.671		0.949	pCi/g	11/20/20 22:00	12/13/20 11:38	1

**Lab Sample ID: LCS 160-489915/2-A** **Client Sample ID: Lab Control Sample**  
**Matrix: Solid** **Prep Type: Total/NA**  
**Analysis Batch: 491634** **Prep Batch: 489915**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits
Cesium-137	26.7	26.06		2.78	0.0700	0.0927	pCi/g	97	87 - 120
Cobalt-60	9.47	9.053		0.959		0.0121	pCi/g	96	87 - 115

# QC Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
 SDG: GJ46599771

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: 160-40423-15 DU  
 Matrix: Solid  
 Analysis Batch: 491630

Client Sample ID: HPPG-ESU-TU077A-015  
 Prep Type: Total/NA  
 Prep Batch: 489915

Analyte	Sample		DU		Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER Limit
	Result	Qual	Result	Qual						
Actinium 228	0.543		0.7014		0.213		0.0334	pCi/g	0.43	1
Actinium-227	-0.257	U	0.06118	U	0.225		0.412	pCi/g	0.42	1
Bismuth-212	0.310	U	0.2881	U	0.759		0.595	pCi/g	0.02	1
Bismuth-214	0.309		0.4740		0.166		0.0709	pCi/g	0.61	1
Cesium-137	-0.0139	U	0.03675	U	0.0877	0.0700	0.0695	pCi/g	0.38	1
Lead-210	1.01		0.9717	U	1.45		1.03	pCi/g	0.01	1
Lead-212	0.552		0.5200		0.121		0.0528	pCi/g	0.14	1
Lead-214	0.515		0.4095		0.173		0.113	pCi/g	0.38	1
Potassium-40	8.99		9.491		1.74		0.129	pCi/g	0.15	1
Protactinium-231	-0.156	U	0.0000	U	0.567		3.22	pCi/g	0.14	1
Protactinium-234	0.0850	U	0.01819	U	0.0325		0.293	pCi/g	0.24	1
Radium-226	0.309		0.4740		0.166	0.200	0.0709	pCi/g	0.61	1
Radium-228	0.543		0.7014		0.213		0.0334	pCi/g	0.43	1
Thallium-208	0.193		0.1847		0.0746		0.0275	pCi/g	0.07	1
Thorium 228	0.552		0.5200		0.121		0.0528	pCi/g	0.14	1
Thorium-232	0.543		0.7014		0.213		0.0334	pCi/g	0.43	1
Thorium-234	0.930		-1.098	U	0.650		1.06	pCi/g	1.91	1
Uranium-235	0.000	U	0.0000	U	0.174		0.496	pCi/g	0	1
Uranium-238	0.930		-1.098	U	0.650		1.06	pCi/g	1.91	1

# QC Association Summary

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
 SDG: GJ46599771

## Rad

### Leach Batch: 489450

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40423-1	HPPG-ESU-TU077A-001	Total/NA	Solid	Dry and Grind	
160-40423-2	HPPG-ESU-TU077A-002	Total/NA	Solid	Dry and Grind	
160-40423-3	HPPG-ESU-TU077A-003	Total/NA	Solid	Dry and Grind	
160-40423-4	HPPG-ESU-TU077A-004	Total/NA	Solid	Dry and Grind	
160-40423-5	HPPG-ESU-TU077A-005	Total/NA	Solid	Dry and Grind	
160-40423-6	HPPG-ESU-TU077A-006	Total/NA	Solid	Dry and Grind	
160-40423-7	HPPG-ESU-TU077A-007	Total/NA	Solid	Dry and Grind	
160-40423-8	HPPG-ESU-TU077A-008	Total/NA	Solid	Dry and Grind	
160-40423-9	HPPG-ESU-TU077A-009	Total/NA	Solid	Dry and Grind	
160-40423-10	HPPG-ESU-TU077A-010	Total/NA	Solid	Dry and Grind	
160-40423-11	HPPG-ESU-TU077A-011	Total/NA	Solid	Dry and Grind	
160-40423-12	HPPG-ESU-TU077A-012	Total/NA	Solid	Dry and Grind	
160-40423-13	HPPG-ESU-TU077A-013	Total/NA	Solid	Dry and Grind	
160-40423-14	HPPG-ESU-TU077A-014	Total/NA	Solid	Dry and Grind	
160-40423-9 DU	HPPG-ESU-TU077A-009	Total/NA	Solid	Dry and Grind	

### Leach Batch: 489454

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40423-15	HPPG-ESU-TU077A-015	Total/NA	Solid	Dry and Grind	
160-40423-16	HPPG-ESU-TU077A-016	Total/NA	Solid	Dry and Grind	
160-40423-17	HPPG-ESU-TU077A-017	Total/NA	Solid	Dry and Grind	
160-40423-18	HPPG-ESU-TU077A-018	Total/NA	Solid	Dry and Grind	
160-40423-19	HPPG-ESU-TU077A-019	Total/NA	Solid	Dry and Grind	
160-40423-20	HPPG-ESU-TU077A-020	Total/NA	Solid	Dry and Grind	
160-40423-21	HPPG-ESU-TU077A-021	Total/NA	Solid	Dry and Grind	
160-40423-22	HPPG-ESU-TU077A-022	Total/NA	Solid	Dry and Grind	
160-40423-23	HPPG-ESU-TU077A-023	Total/NA	Solid	Dry and Grind	
160-40423-24	HPPG-ESU-TU077A-024	Total/NA	Solid	Dry and Grind	
160-40423-25	HPPG-ESU-TU077A-025	Total/NA	Solid	Dry and Grind	
160-40423-26	HPPG-F-033	Total/NA	Solid	Dry and Grind	
160-40423-27	HPPG-F-034	Total/NA	Solid	Dry and Grind	
160-40423-15 DU	HPPG-ESU-TU077A-015	Total/NA	Solid	Dry and Grind	
160-40423-23 DU	HPPG-ESU-TU077A-023	Total/NA	Solid	Dry and Grind	

### Prep Batch: 489912

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40423-16	HPPG-ESU-TU077A-016	Total/NA	Solid	Fill_Geo-21	489454
160-40423-17	HPPG-ESU-TU077A-017	Total/NA	Solid	Fill_Geo-21	489454
160-40423-18	HPPG-ESU-TU077A-018	Total/NA	Solid	Fill_Geo-21	489454
160-40423-19	HPPG-ESU-TU077A-019	Total/NA	Solid	Fill_Geo-21	489454
160-40423-20	HPPG-ESU-TU077A-020	Total/NA	Solid	Fill_Geo-21	489454
160-40423-21	HPPG-ESU-TU077A-021	Total/NA	Solid	Fill_Geo-21	489454
160-40423-22	HPPG-ESU-TU077A-022	Total/NA	Solid	Fill_Geo-21	489454
160-40423-23	HPPG-ESU-TU077A-023	Total/NA	Solid	Fill_Geo-21	489454
MB 160-489912/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-489912/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40423-23 DU	HPPG-ESU-TU077A-023	Total/NA	Solid	Fill_Geo-21	489454

### Prep Batch: 489913

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40423-24	HPPG-ESU-TU077A-024	Total/NA	Solid	Fill_Geo-21	489454

Eurofins TestAmerica, St. Louis

# QC Association Summary

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
 SDG: GJ46599771

## Rad (Continued)

### Prep Batch: 489913 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40423-25	HPPG-ESU-TU077A-025	Total/NA	Solid	Fill_Geo-21	489454
160-40423-26	HPPG-F-033	Total/NA	Solid	Fill_Geo-21	489454
160-40423-27	HPPG-F-034	Total/NA	Solid	Fill_Geo-21	489454
MB 160-489913/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-489913/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

### Prep Batch: 489914

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40423-1	HPPG-ESU-TU077A-001	Total/NA	Solid	Fill_Geo-21	489450
160-40423-2	HPPG-ESU-TU077A-002	Total/NA	Solid	Fill_Geo-21	489450
160-40423-3	HPPG-ESU-TU077A-003	Total/NA	Solid	Fill_Geo-21	489450
160-40423-4	HPPG-ESU-TU077A-004	Total/NA	Solid	Fill_Geo-21	489450
160-40423-5	HPPG-ESU-TU077A-005	Total/NA	Solid	Fill_Geo-21	489450
160-40423-6	HPPG-ESU-TU077A-006	Total/NA	Solid	Fill_Geo-21	489450
160-40423-7	HPPG-ESU-TU077A-007	Total/NA	Solid	Fill_Geo-21	489450
160-40423-8	HPPG-ESU-TU077A-008	Total/NA	Solid	Fill_Geo-21	489450
160-40423-9	HPPG-ESU-TU077A-009	Total/NA	Solid	Fill_Geo-21	489450
MB 160-489914/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-489914/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40423-9 DU	HPPG-ESU-TU077A-009	Total/NA	Solid	Fill_Geo-21	489450

### Prep Batch: 489915

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40423-10	HPPG-ESU-TU077A-010	Total/NA	Solid	Fill_Geo-21	489450
160-40423-11	HPPG-ESU-TU077A-011	Total/NA	Solid	Fill_Geo-21	489450
160-40423-12	HPPG-ESU-TU077A-012	Total/NA	Solid	Fill_Geo-21	489450
160-40423-13	HPPG-ESU-TU077A-013	Total/NA	Solid	Fill_Geo-21	489450
160-40423-14	HPPG-ESU-TU077A-014	Total/NA	Solid	Fill_Geo-21	489450
160-40423-15	HPPG-ESU-TU077A-015	Total/NA	Solid	Fill_Geo-21	489454
MB 160-489915/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-489915/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40423-15 DU	HPPG-ESU-TU077A-015	Total/NA	Solid	Fill_Geo-21	489454

### Leach Batch: 491544

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40423-1	HPPG-ESU-TU077A-001	Total/NA	Solid	Dry and Grind	
160-40423-11	HPPG-ESU-TU077A-011	Total/NA	Solid	Dry and Grind	

### Prep Batch: 492111

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40423-21	HPPG-ESU-TU077A-021	Total/NA	Solid	DPS-7	489454
160-40423-26	HPPG-F-033	Total/NA	Solid	DPS-7	489454
MB 160-492111/22-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-492111/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	

### Prep Batch: 493370

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40423-1	HPPG-ESU-TU077A-001	Total/NA	Solid	DPS-7	491544
160-40423-11	HPPG-ESU-TU077A-011	Total/NA	Solid	DPS-7	491544
MB 160-493370/23-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-493370/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	

Eurofins TestAmerica, St. Louis

# Tracer/Carrier Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1  
SDG: GJ46599771

Method: 905 - Strontium-90 (GFPC)

Matrix: Solid

Prep Type: Total/NA

## Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Sr (40-110)	Y (40-110)
160-40423-1	HPPG-ESU-TU077A-001	101	86.7
160-40423-11	HPPG-ESU-TU077A-011	95.2	88.2
160-40423-21	HPPG-ESU-TU077A-021	102	92.7
160-40423-26	HPPG-F-033	92.1	93.1
LCS 160-492111/1-A	Lab Control Sample	102	94.6
LCS 160-493370/1-A	Lab Control Sample	102	87.1
MB 160-492111/22-A	Method Blank	96.8	94.6
MB 160-493370/23-A	Method Blank	103	84.9

### Tracer/Carrier Legend

Sr = Sr Carrier

Y = Y Carrier

## ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis  
13715 Rider Trail North  
Earth City, MO 63045  
Tel: (314)298-8566

Laboratory Job ID: 160-40443-1  
Laboratory Sample Delivery Group: D1189463  
Client Project/Site: HPNS-Parcel G 501197  
Revision: 1

For:  
Aptim Federal Services LLC  
4005 Port Chicago Hwy, Suite 200  
Concord, California 94520

Attn: Rose Condit

*Rhonda Ridenhower*

---

Authorized for release by:  
4/12/2021 12:24:30 PM

Rhonda Ridenhower, Client Service Manager  
(314)298-8566  
Rhonda.Ridenhower@Eurofinset.com

### LINKS

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*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

# Table of Contents

Cover Page . . . . .	1
Table of Contents . . . . .	2
Case Narrative . . . . .	3
Chain of Custody . . . . .	5
Receipt Checklists . . . . .	7
Definitions/Glossary . . . . .	8
Method Summary . . . . .	9
Sample Summary . . . . .	10
Client Sample Results . . . . .	11
QC Sample Results . . . . .	12
QC Association Summary . . . . .	14
Tracer Carrier Summary . . . . .	15



# Case Narrative

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40443-1  
SDG: D1189463

Job ID: 160-40443-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

## CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40443-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Additional information requested in case narrative for total strontium

# Case Narrative

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40443-1  
SDG: D1189463

## Job ID: 160-40443-1 (Continued)

### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

#### RECEIPT

The samples were received on 11/17/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 12.3 C.

#### STRONTIUM-90 (GFPC)

Sample HPPG-ESU-TU077A-B-001 (160-40443-1) was analyzed for Strontium-90 (GFPC) in accordance with EPA 905. The samples were dried on 11/23/2020, prepared on 12/16/2020 and analyzed on 01/04/2021.

Strontium-90 prep batch 492111

The method blank (MB) z-score associated with Prep Batch 160-492111 is within limits and is stored in the level IV raw data. (MB 160-492111/22-A)

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-ESU-TU077A-B-001 (160-40443-1).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Sample HPPG-ESU-TU077A-B-001 (160-40443-1) was analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA\_01\_R. The samples were dried on 11/23/2020, prepared on 11/25/2020 and analyzed on 12/16/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

Gamma prep batch 490251

The method blank (MB) z-score associated with Prep Batch 160-490251 is within limits and is stored in the level IV raw data. (MB 160-490251/1-A)

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



# CHAIN OF CUSTODY

Ref. Document # 501197RSY-032

APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520

Project Manager: Lisa Bercik  
Phone #: (619)213-3389

Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy

Sample Lead: Murri, Andrew

Sample Tech(s): Paul Leblanc

Project Number: 501197  
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action  
Project Location: San Francisco, CA  
Purchase Order #: 1159058  
Shipment/Pickup Date: 11/16/2020  
Waybill Number: 4457 0225 6078  
Lab Destination: Test America (St. Louis Lab)  
13715 Rider Trail North  
Earth City, MO 63046  
Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Analysis Requested							Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method			Preservatives (water)	Preservatives (soil)	Container Type	Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)					
HPPG-ESU-TU077A-B-001	11/11/2020	15:34	G	SO	1	16 oz. plastic jar	X	X					5	D1189463	

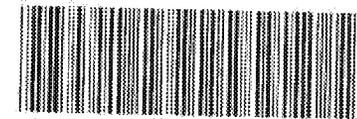
Special Instructions: **21 day ingrowth results only**

Turnaround Time: 3-day  10-Day  28-day  Other  Level of QC Required: I  II  III  Project Specific

Method Codes C = Composite G = Grab Matrix Codes: DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Murri, Andrew		11/11/2020 17:08	Locked Storage (RKillpack)		11/11/2020 17:08
Locked Storage (RKillpack)		11/16/2020 14:22	Devin Lewis		11/16/2020 14:22
Devin Lewis		11/16/2020 14:26	SHIPPEDTOLAB		11/17/2020 09:05

\*\*\* Last 3 transfers shown above - Complete list of transfers on last page \*\*\*



150-40443 Chain of Custody



# All Transfers for COC 501197RSY-032

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Murri, Andrew		11/11/2020 17:08	Locked Storage (RKillpack)		11/11/2020 17:08
Locked Storage (RKillpack)		11/16/2020 14:22	Devin Lewis		11/16/2020 14:22
Devin Lewis		11/16/2020 14:26	SHIPPEDTOLAB		



## Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40443-1

SDG Number: D1189463

**Login Number: 40443**

**List Number: 1**

**Creator: Mazariegos, Leonel A**

**List Source: Eurofins TestAmerica, St. Louis**

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

# Definitions/Glossary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40443-1  
SDG: D1189463

## Qualifiers

### Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

# Method Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40443-1  
SDG: D1189463

Method	Method Description	Protocol	Laboratory
905	Strontium-90 (GFPC)	EPA	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-7	Preparation, Digestion/Precipitate Separation (7-Day In-Growth)	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

**Protocol References:**

- DOE = U.S. Department of Energy
- EPA = US Environmental Protection Agency
- None = None

**Laboratory References:**

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

# Sample Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40443-1  
SDG: D1189463

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Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40443-1	HPPG-ESU-TU077A-B-001	Solid	11/11/20 15:34	11/17/20 09:05	

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# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40443-1  
 SDG: D1189463

**Client Sample ID: HPPG-ESU-TU077A-B-001**

**Lab Sample ID: 160-40443-1**

Date Collected: 11/11/20 15:34

Matrix: Solid

Date Received: 11/17/20 09:05

**Method: 905 - Strontium-90 (GFPC)**

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Strontium-90	-0.0903	U	0.151	0.151	0.331	0.131	pCi/g	12/16/20 14:29	01/04/21 13:55	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	96.8		40 - 110					12/16/20 14:29	01/04/21 13:55	1
Y Carrier	94.6		40 - 110					12/16/20 14:29	01/04/21 13:55	1

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
<b>Actinium 228</b>	<b>0.450</b>		0.139	0.146		0.0238	pCi/g	11/25/20 12:41	12/16/20 09:16	1
Actinium-227	0.126	U	0.524	0.524		0.322	pCi/g	11/25/20 12:41	12/16/20 09:16	1
Bismuth-212	-0.413	U	0.691	0.692		0.629	pCi/g	11/25/20 12:41	12/16/20 09:16	1
<b>Bismuth-214</b>	<b>0.547</b>		0.117	0.130		0.0239	pCi/g	11/25/20 12:41	12/16/20 09:16	1
Cesium-137	0.00825	U	0.0655	0.0655	0.0700	0.0534	pCi/g	11/25/20 12:41	12/16/20 09:16	1
Lead-210	0.552	U	0.938	0.940		0.673	pCi/g	11/25/20 12:41	12/16/20 09:16	1
<b>Lead-212</b>	<b>0.485</b>		0.0831	0.104		0.0349	pCi/g	11/25/20 12:41	12/16/20 09:16	1
<b>Lead-214</b>	<b>0.430</b>		0.100	0.110		0.0384	pCi/g	11/25/20 12:41	12/16/20 09:16	1
<b>Potassium-40</b>	<b>8.76</b>		1.40	1.66		0.413	pCi/g	11/25/20 12:41	12/16/20 09:16	1
Protactinium-231	-0.0000003	U	2.15	2.15		1.77	pCi/g	11/25/20 12:41	12/16/20 09:16	1
	52									
Protactinium-234	0.0737	U	0.181	0.181		0.153	pCi/g	11/25/20 12:41	12/16/20 09:16	1
<b>Radium-226</b>	<b>0.547</b>		0.117	0.130	0.200	0.0239	pCi/g	11/25/20 12:41	12/16/20 09:16	1
<b>Radium-228</b>	<b>0.450</b>		0.139	0.146		0.0238	pCi/g	11/25/20 12:41	12/16/20 09:16	1
<b>Thallium-208</b>	<b>0.163</b>		0.0525	0.0552		0.0203	pCi/g	11/25/20 12:41	12/16/20 09:16	1
<b>Thorium 228</b>	<b>0.485</b>		0.0831	0.104		0.0349	pCi/g	11/25/20 12:41	12/16/20 09:16	1
<b>Thorium-232</b>	<b>0.450</b>		0.139	0.146		0.0238	pCi/g	11/25/20 12:41	12/16/20 09:16	1
<b>Thorium-234</b>	<b>0.560</b>		0.408	0.413		0.311	pCi/g	11/25/20 12:41	12/16/20 09:16	1
Uranium-235	0.000	U	0.0817	0.0817		0.260	pCi/g	11/25/20 12:41	12/16/20 09:16	1
<b>Uranium-238</b>	<b>0.560</b>		0.408	0.413		0.311	pCi/g	11/25/20 12:41	12/16/20 09:16	1

# QC Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40443-1  
 SDG: D1189463

## Method: 905 - Strontium-90 (GFPC)

Lab Sample ID: MB 160-492111/22-A  
 Matrix: Solid  
 Analysis Batch: 493835

Client Sample ID: Method Blank  
 Prep Type: Total/NA  
 Prep Batch: 492111

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	-0.03798	U	0.125	0.125	0.331	0.106	pCi/g	12/16/20 14:29	01/04/21 13:58	1
Carrier	MB %Yield	MB Qualifier	Limits		Prepared	Analyzed	Dil Fac			
Sr Carrier	96.8		40 - 110		12/16/20 14:29	01/04/21 13:58	1			
Y Carrier	94.6		40 - 110		12/16/20 14:29	01/04/21 13:58	1			

Lab Sample ID: LCS 160-492111/1-A  
 Matrix: Solid  
 Analysis Batch: 493723

Client Sample ID: Lab Control Sample  
 Prep Type: Total/NA  
 Prep Batch: 492111

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Strontium-90	7.75	6.756		0.712	0.331	0.115	pCi/g	87	75 - 125
Carrier	LCS %Yield	LCS Qualifier	Limits						
Sr Carrier	102		40 - 110						
Y Carrier	94.6		40 - 110						

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-490251/1-A  
 Matrix: Solid  
 Analysis Batch: 491974

Client Sample ID: Method Blank  
 Prep Type: Total/NA  
 Prep Batch: 490251

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	-0.03597	U	0.172	0.172		0.0883	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Actinium-227	0.03931	U	0.411	0.411		0.242	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Bismuth-212	-0.01937	U	0.627	0.627		0.515	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Bismuth-214	0.06141	U	0.0409	0.0414		0.0994	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Cesium-137	0.01744	U	0.0370	0.0370	0.0700	0.0279	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Lead-210	0.3174	U	0.607	0.608		0.459	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Lead-212	-0.01690	U	0.0232	0.0233		0.0609	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Lead-214	-0.1053	U	0.0728	0.0736		0.0768	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Potassium-40	-0.1420	U	0.809	0.809		0.382	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Protactinium-231	0.0000	U	0.429	0.429		1.77	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Protactinium-234	0.02212	U	0.0198	0.0199		0.189	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Radium-226	0.06141	U	0.0409	0.0414	0.200	0.0994	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Radium-228	-0.03597	U	0.172	0.172		0.0883	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Thallium-208	-0.02237	U	0.0311	0.0311		0.0361	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Thorium 228	-0.01690	U	0.0232	0.0233		0.0609	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Thorium-232	-0.03597	U	0.172	0.172		0.0883	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Thorium-234	0.0000	U	0.196	0.196		0.526	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Uranium-235	0.1380	U	0.255	0.255		0.290	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Uranium-238	0.0000	U	0.196	0.196		0.526	pCi/g	11/25/20 12:41	12/16/20 09:13	1

Eurofins TestAmerica, St. Louis

# QC Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40443-1  
 SDG: D1189463

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

**Lab Sample ID: LCS 160-490251/2-A**  
**Matrix: Solid**  
**Analysis Batch: 491973**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 490251**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec.
									Limits
Americium-241	96.4	99.40		11.7		0.609	pCi/g	103	87 - 116
Cesium-137	26.7	30.20		3.17	0.0700	0.105	pCi/g	113	87 - 120
Cobalt-60	9.46	10.09		1.07		0.0489	pCi/g	107	87 - 115

# QC Association Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40443-1  
SDG: D1189463

## Rad

### Leach Batch: 489957

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40443-1	HPPG-ESU-TU077A-B-001	Total/NA	Solid	Dry and Grind	

### Prep Batch: 490251

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40443-1	HPPG-ESU-TU077A-B-001	Total/NA	Solid	Fill_Geo-21	489957
MB 160-490251/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-490251/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

### Prep Batch: 492111

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40443-1	HPPG-ESU-TU077A-B-001	Total/NA	Solid	DPS-7	489957
MB 160-492111/22-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-492111/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	

# Tracer/Carrier Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40443-1  
SDG: D1189463

Method: 905 - Strontium-90 (GFPC)

Matrix: Solid

Prep Type: Total/NA

## Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Sr (40-110)	Y (40-110)
160-40443-1	HPPG-ESU-TU077A-B-001	96.8	94.6
LCS 160-492111/1-A	Lab Control Sample	102	94.6
MB 160-492111/22-A	Method Blank	96.8	94.6

### Tracer/Carrier Legend

Sr = Sr Carrier

Y = Y Carrier